RAILWAY

TRACK and STRUCTURES

November

In This Issue . . .

What Makes Damp Rail Slippery?

Web Failures and Their Prevention

2,700-Ft Bridge Raised 8 Ft.

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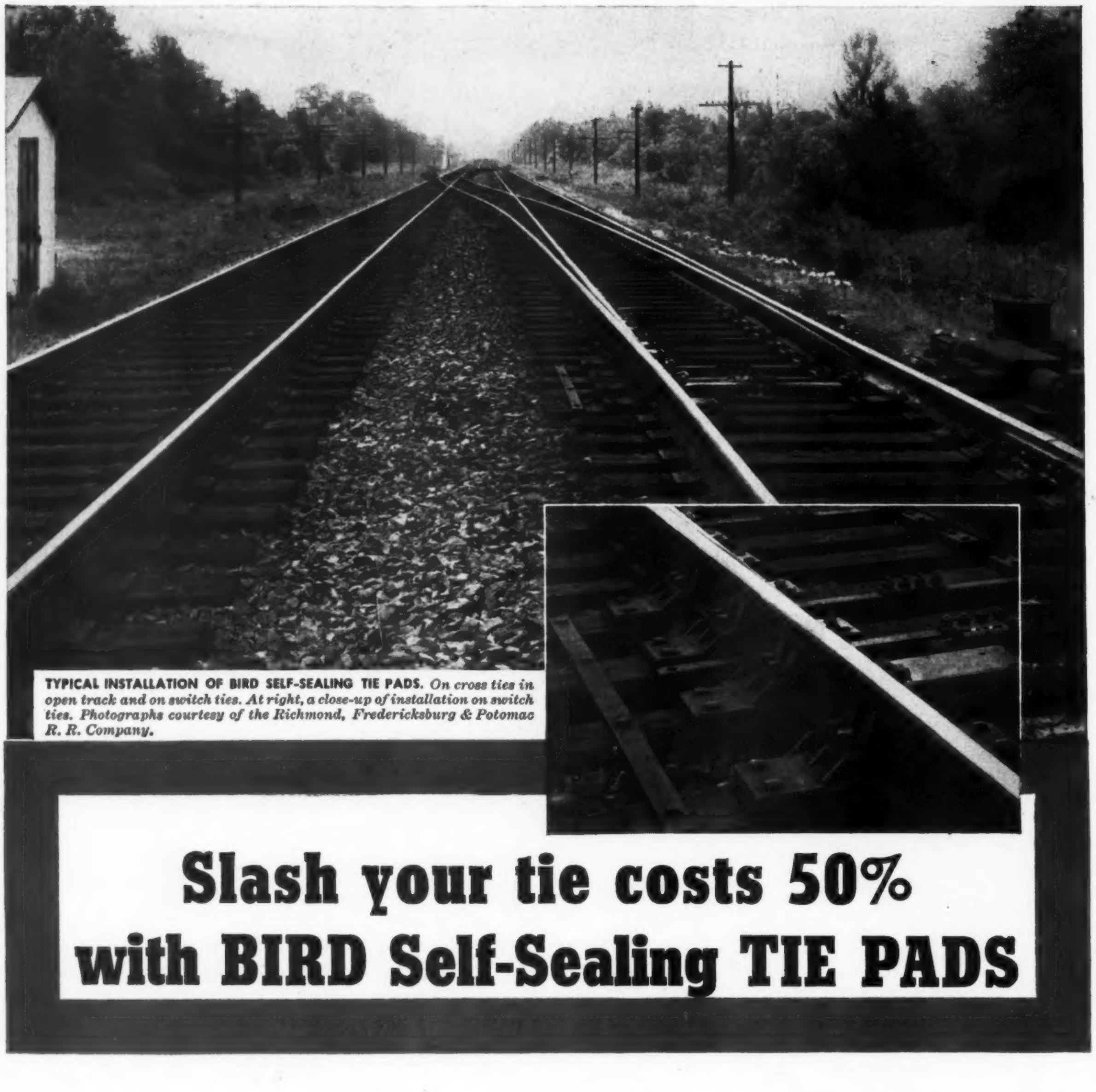

TYPICAL INSTALLATION OF BIRD SELF-SEALING TIE PADS. *On cross ties in open track and on switch ties. At right, a close-up of installation on switch ties. Photographs courtesy of the Richmond, Fredericksburg & Potomac R. R. Company.*

one rod for both

Airco Railroad Rod provides a single answer to these two common types of rail damage. You can use it to build up battered and chipped rail ends, or, by a simple adjustment of the welding torch's oxyacetylene flame, to fill in and smooth out rail burns. Hardness of the deposit is 251 to 350 Brinell—well within the required range for both applications. Airco Railroad Rod is standard on many major railroads, not only because it eases stocking problems but also because of the high quality of its deposit.

Your Airco railroad representative will be glad to arrange an actual demonstration. Why not get in touch with him today?

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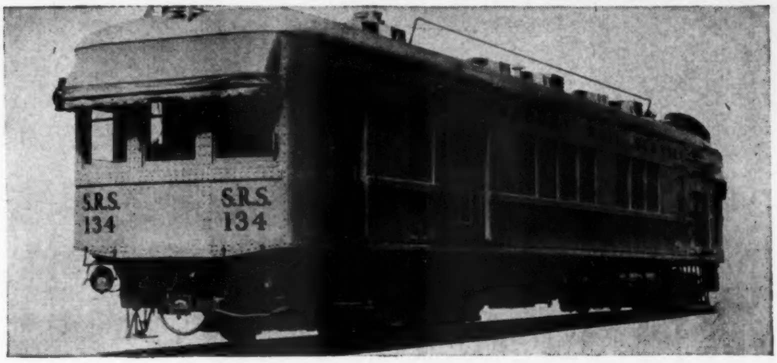
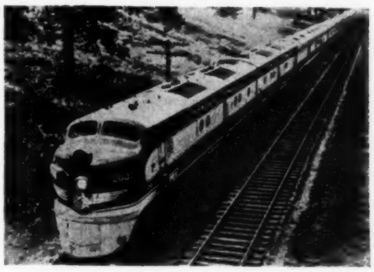
insures against costly rail failure with SPERRY RAIL SERVICE

THE TEXAS T AND P PACIFIC RAILWAY
TEXARKANA SHREVEPORT EL PASO NEW ORLEANS

"Sperry Rail Service plays a very important part in our operation," reports Mr. R. J. Gammie, Chief Engineer, The Texas and Pacific Railway Company. "It provides the best insurance against injuries to passengers and employees and against damage to or destruction of freight. Each defective rail is a potential accident, its detection and removal eliminates that hazard."

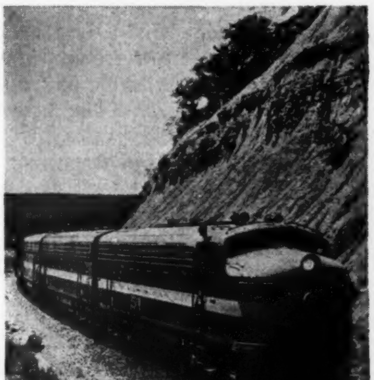


"We started using Sperry Service in 1933 and have continued to use their testing equipment each year since that time." Mr. Gammie adds, "The results have been gratifying; 90% of the defects detected from the beginning of our 1954 program to date are small defects." Sperry Detector Car 134 is shown testing T & P track. Up-to-date equipment like this assures highly efficient performance.



Keeping schedules like that of the Texas Eagle calls for fine timing. Mr. Gammie continues, "Our decision to assign a train master to all detector car operations proved economically sound. His cooperation with the railroad representative guarantees optimum testing performance; at the same time maintains proper operation of trains."

Programmed rail testing on the T & P is explained by Mr. Gammie as follows: "Sperry Detector Cars test parts of our territory once, parts twice and parts as much as four times a year. Testing frequency depends on the age of the rail, traffic density and rate of defect occurrence. Our testing schedule is worked out annually in cooperation with the other roads in our area. Such group testing is advantageous to all roads concerned. It permits scheduling testing equipment with a minimum of delay in transfers between roads and helps maintain proper test intervals."



Sperry

FIRST IN RAIL TESTING

SPERRY RAIL SERVICE

Division of Sperry Products, Inc.
Danbury, Conn.
New York   Chicago   St. Louis

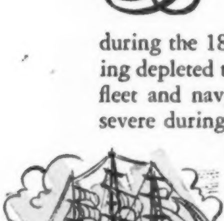
Continuous research and development, an important part of Sperry Service, contributes this exclusive advantage; positive assurance that Sperry detection methods and equipment are always the most advanced in existence. Whatever your testing problem, rail-in-track, diesel axles, wheels or other vital components, it's more than likely Sperry has a solution. Write or phone for complete information.

AMCRECO
LOWRY PROCESS
CREOSOTED WOOD
1904·1954

50th

MARKS FIRST HALF CENTURY OF
MADE POSSIBLE BY THE INVENTION
C. B. LOWRY, FOUNDER OF THE

THE durability of wood was a problem even in earliest times. The first country, however, to realize that wood preservation was a matter of national importance was England during the 18th century when her forests were being depleted to build and maintain a vast merchant fleet and navy. The problem became increasingly severe during the 19th century in England and in Europe with the growth of the railroad systems.



The threatening timber famine touched off feverish experimentation to find a suitable wood preservative, but none was found until about 1838, when John Bethell patented his process in England. At about this same time, preservatives other than creosote (dead oil of coal tar) were introduced, but the Bethell creosoting process proved to be the most reliable and, to a great extent, replaced all other processes abroad.

By 1880, it was becoming evident that the vast forests of the United States were being depleted at a high rate and that the time for action to prevent complete exhaustion was approaching. In this year, the American Society of Civil Engineers appointed a committee to study the problem. After several years of study, the committee reported that the Bethell Creosoting Process was the most effective method of wood preservation, but the cost was prohibitive due to the high price and scarcity of creosote in the United States, and the excessive amounts required to do a suitable job.

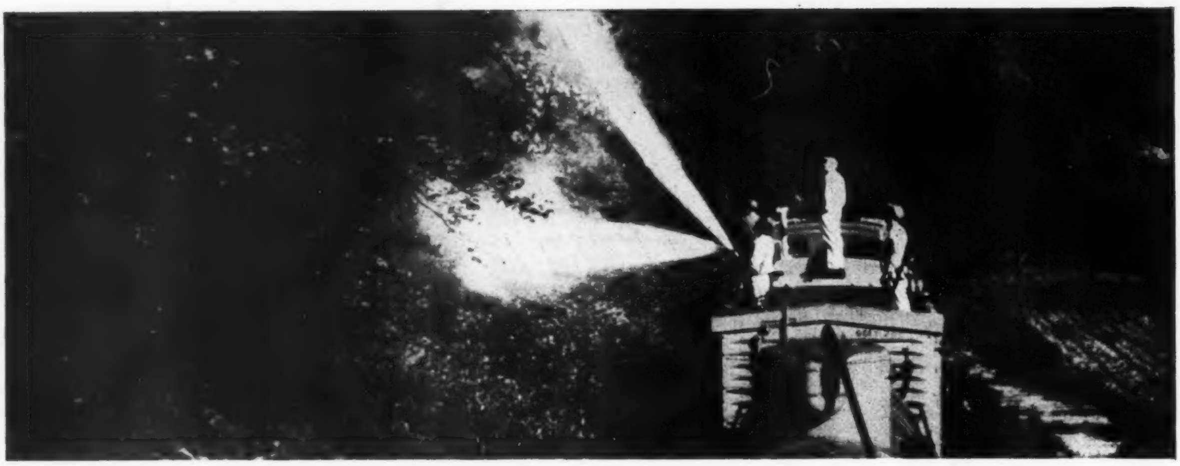
It was not until about 1904, after the development of the Lowry Process and the founding of the American Creosoting Company, that modern wood preservation was born.

FIFTY YEARS AGO, in a plant at Shirley, Indiana, the Columbia Creosoting Company started wood preserving operations for the Big Four Railroad Company (New York Central System) with a revolutionary technique called the Lowry Process. The rest is history. The Columbia Creosoting Company went on to become the American Creosoting Company of today, and its birth marked the beginning of the modern era of wood preservation.

The Lowry Process opened the door to the modern era by making it possible to impregnate wood successfully with far less creosote and in far less time than was required with Bethell's method. The Lowry Process cut the cost of creosoting practically in half.

Mr. C. B. Lowry, a founder of the American Creosoting Company, conceived the idea for his process about 1902, demonstrated it in an experimental plant for the Big Four Railroad at Riverside, Ohio in 1903, used it in commercial operations for the Big Four at the Shirley plant in 1904, and applied for a patent in 1905.

A method of treatment later known as the Ruping Process was introduced in Germany. Although there were important basic differences, the Ruping method was similar to the Lowry process insofar as it reduced the quantity of creosote used. Afterward, the German inventor of the Ruping Process filed an infringement suit against Lowry.



Weeds-Grass-Brush?

We can solve YOUR weed control problems with the RIGHT chemicals and application service

Our complete line of proven weed, grass and brush killing chemicals includes:

Atlacide Liquid	Methoxone-Chlorax
Atlacide Spray Powder	CMU
Chlorax Liquid	Brush Killer
Chlorax Spray Powder	Atlas Contact
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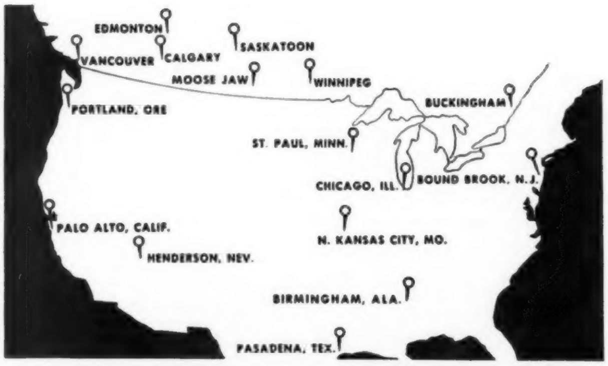


16 Strategically Located Chipman Plants

CHIPMAN
CHEMICAL COMPANY

Manufacturers of Railroad Weed Killing Chemicals Since 1912

Self-propelled 205 *runs on rails*

saves travel time between jobs . . .

Where conventional excavators and cranes have to be moved off-track over long, round-about routes from one job to the next, the Koehring 205 takes to the rails. RailAid powers its own rail-propulsion car . . . travels on-track at speeds up to 20 m.p.h.

You can send it anywhere along the line, at a moment's notice, to do any digging, lifting or material-handling jobs: cleans ditches, widens embankments . . . loads, unloads cars, stockpiles ballast, coal . . . repairs trestles, drives piles, lays rails . . . handles scrap or salvage.

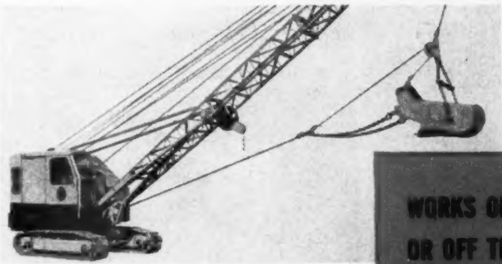
Because all travel is by rail, crawler life is considerably increased. Yet, you have complete flexibility for working on or off-track.

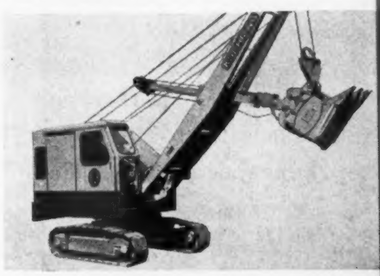
Clears the track in 10 minutes

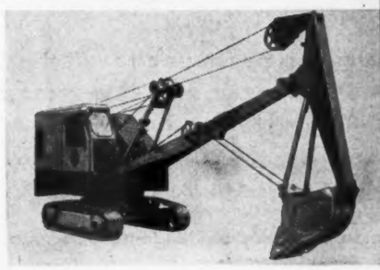
Crane loads or unloads itself on ramp-equipped car in less than 10 minutes. Sets car on or off-track . . . clears the right-of-way for normal through traffic. Work of RailAid and crew is uninterrupted during entire shift. Crane safely lifts 6.9 tons from the car, 8.9 tons on ground . . . readily converts to magnet crane, pile driver, clamshell, dragline, ½-yard shovel or hoe. Learn more about this versatile on-and-off-track RailAid . . . write: Koehring Co., Milwaukee 16, Wisconsin.

KOEHRING **RailAid®**

(Subsidiaries: KWIK-MIX • PARSONS • JOHNSON)



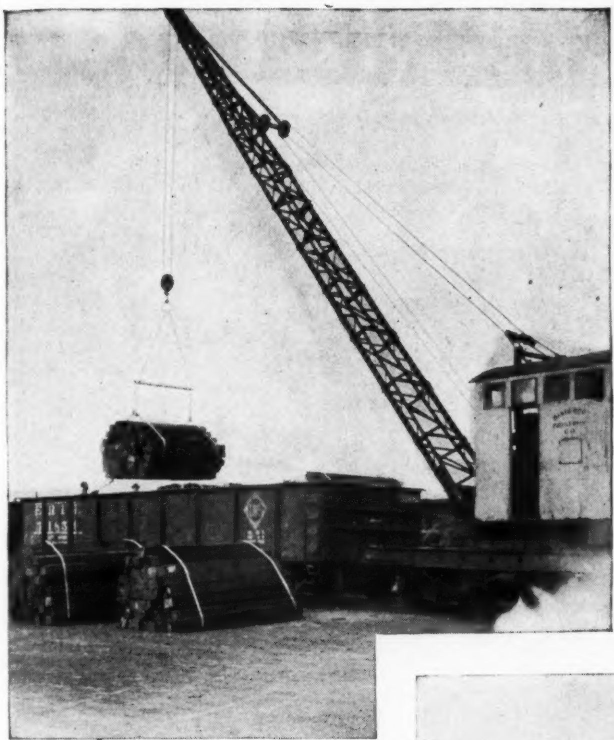




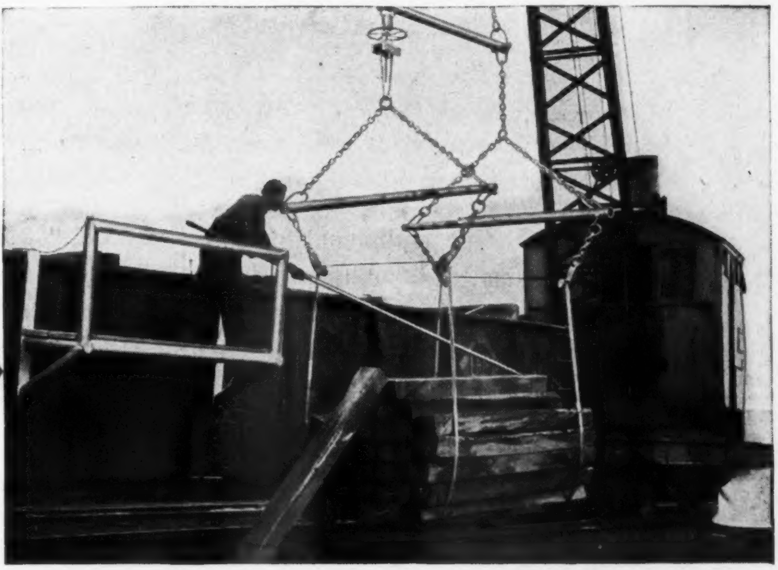
WORKS ON OR OFF THE PROPULSION CAR WITH ALL STANDARD ATTACHMENTS:

lift crane
magnet crane
pile driver
clamshell
dragline
shovel
hoe

How **Brainard** can help you **cut tie-handling costs**



LOADING—Tram loads of ties, strapped with two special bands of Brainard steel strapping, are lifted quickly from ground stock into loading car. These unit tram loads, prepared at the tie-treating plant, speed stocking and loading.



DISTRIBUTING—Man on catwalk drops ties one at a time from moving car. Ties drop parallel to track. On one railroad, a four-man crew using the Brainard system has replaced a 17-man crew required for manual handling.

BRAINARD'S new system of tie handling is now in use on seven major roads, where it is cutting costs up to 30%. Plans for the special patented lift are available free of charge to railroads and tie-treating plants for production in their own shops.

Call your local Brainard salesman now—for a study of your operations and recommendations. District offices located throughout the U. S.

COMPLETE STEEL STRAPPING SYSTEM, ENGINEERING, STEEL STRAPPING, TOOLS AND ACCESSORIES, ANTI-CHECKING IRONS

For booklet write Brainard Steel Division, Sharon Steel Corp., Dept. S-11, Griswold Street, Warren, Ohio.

Brainard

SHARONSTEEL

STEEL DIVISION
SHARON STEEL CORPORATION

WARREN, OHIO

Daylighting

Main line of the Western Pacific Railroad Company, San Francisco, Calif., extends from Oakland and San Francisco to Salt Lake City, Utah. Most picturesque section of the line is the portion which runs along mountainsides through the Feather River Canyon, nationally advertised as "the route of the Vista-Dome California Zephyrs."

The rugged beauty of the Canyon is also the source of the railroad's chief maintenance problems — snow slides in winter and earth slides at other periods of the year. For speedier maintenance during emergencies, Western Pacific bought 2 rubber-tired Tournatractors, one in 1949 and the other in 1951.

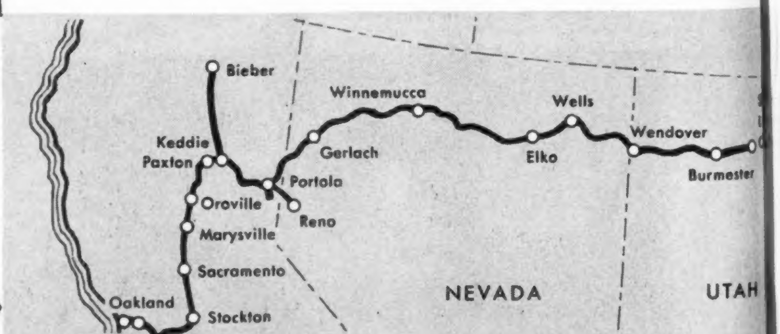
"Quite adaptable to our needs"

Says the Western Pacific's Chief Engineer, "Both of these units have been in continuous operation with only a normal downtime for this class of equipment. They are *very satisfactory* for our purposes and are being used in Feather River Canyon along the main line of our railroad where considerable slope-scaling is being done. The machines are quite adaptable to our needs in that they cross the track one side to the other very easily, run along the tops of the ties, over bridges and through tunnels without any difficulty. They are fast and can reach points of emergency under their own power without necessity of work-train transportation. This fact alone makes the machine quite satisfactory for our use."

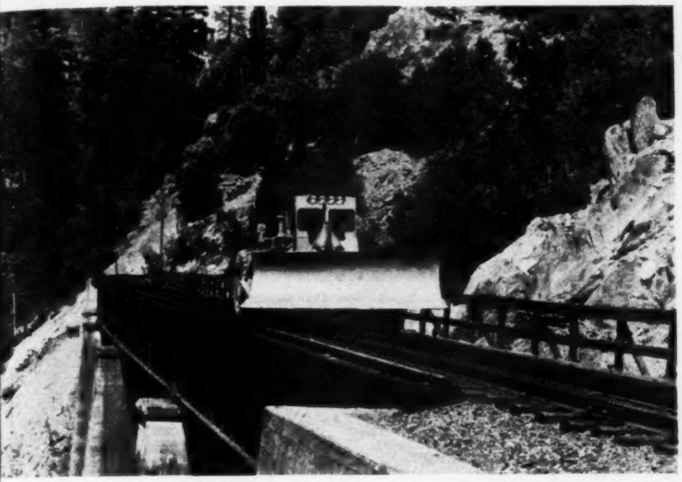
The older of the 2 units usually operates in the Feather River Canyon between Oroville and Portola, a distance of 116 miles. Both are subject to call anywhere they are needed from Salt Lake City to San Francisco.

High above the Feather River near Keddie, Calif., Tournatractor cuts down bank to provide room for railroad plows to dispose of snow in winter. This operation is part of Western Pacific's program to "daylight" cuts and curves.

Western Pacific operates 1,528 mi. of road in 3 states. Its connection at Salt Lake with the D & RGW forms one of the 7 U.S. transcontinental routes.



Curves in the Feather River Canyon



Sure-footed Tournatractor safely crosses trestles and high bridges. Since most of the main line is single track, ability to drive along the track is an important advantage . . . frequently is the only way to reach a job.

Driving through tunnels is all in a day's work for Tournatractor. Wheels are spaced just far enough apart to permit machine to straddle the rails, yet ride on the ties. Low-pressure tires do no damage to ties or rails, nor do rails damage tires.

"Daylights" cuts

On the job pictured, Tournatractor is shown working between Paxton and Keddie, 67 highway miles north of Oroville. Here, it is "daylighting" cuts, then dozing rock and decomposed shale deposited by slides to make room for winter snowplowing. When it completes this job, it will be sent to another in Nevada.

Says Foreman Jack W. Young: "This Tournatractor is a very efficient machine for railroad operation. It has the ability to get out over the tracks fast to doze slides and clear the right-of-way. It runs on its own power anywhere a train can go. Maintenance costs on this machine are very low considering the type of work and rough treatment encountered on this job."

Instant-acting 4-wheel air brakes give Tournatractor operator ample margin of safety for working rear edge of steep banks. Braking surface totals 2822 square inches—4 times as much as on most vehicles.

Get all the facts

For fast, economical right-of-way maintenance on your railroad, check the rubber-tired advantages of Tournatractor. It's a dependable product of the earthmoving subsidiary of Westinghouse Air Brake Company.

FREE . . . "The Railroad Handyman"

20-page book shows how 7-yd. self-loading D Tournapull cuts time and costs on right-of-way maintenance. Send coupon for your free copy. No obligation. Also ask to see our color movie, "Clear the Track."

Name ....

Title ....

Address ....

Railroad ....

Division ....

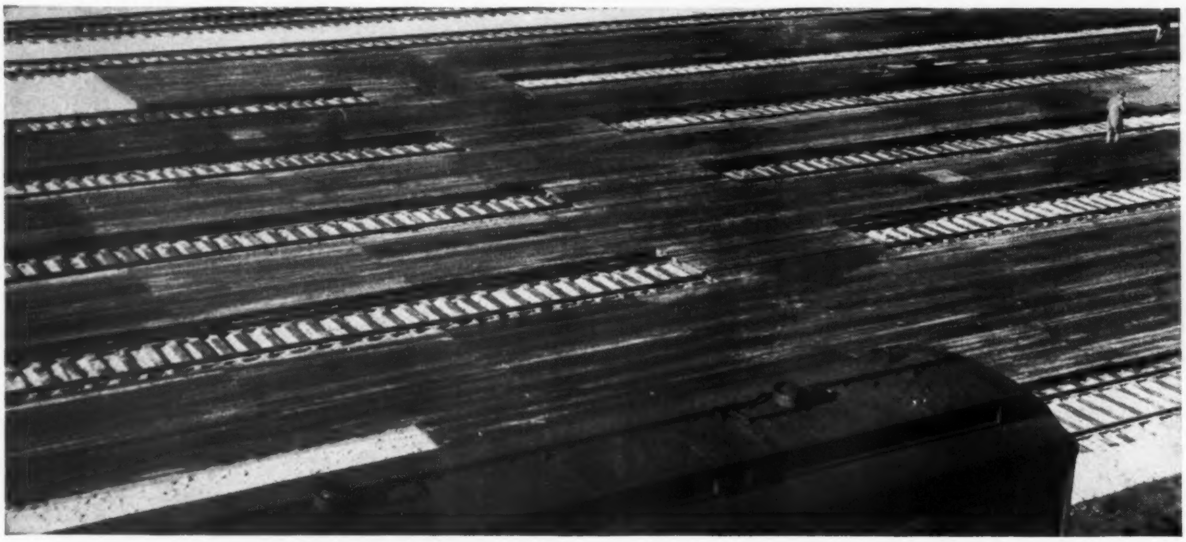
T-705-RR

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Tournatractor—Trademark T-705-RI



News Notes

. . . a resumé of current events throughout the railroad world

RAILWAY
TRACK and STRUCTURES

NOVEMBER, 1954

The Pennsylvania has announced that it will not, in 1955, exchange annual or term passes nor issue trip passes or half-rate orders for use by railroad men traveling on business for their companies. Passes for railroad employees on vacations or other personal trips will, however, continue to be exchanged as in the past.

●

Class I railroads, in the first eight months of this year, had an estimated net income after interest and rentals of $337 million, as compared with a net income of $571 million during the same period of 1953.

●

Industrial television is now being used by the Southern Pacific in a test installation in one of its yards at Los Angeles to aid in watching freight-car movements and general switching operations over a large area. The set-up includes two TV cameras, one with a wide lens and one with telescopic lens, mounted on a special structure atop the general yardmaster's tower. Over a TV viewer in his office, the terminal superintendent gets a wide picture of yard activities in a 40-track area where freight trains are made up. Pressing a button brings in a picture from the telescopic lens, giving him a close-up of yard operations 2,000 ft away.

●

"Why are airlines carrying 3-cent mail when last year the post office department had a loss of more than $29 million in handling air mail at 6 cents? Why is the risk of destroying railway mail service being taken, when surface carriers last year gave the post office a profit of $39 million? Why is the post office, which operates at a large deficit, doing the very thing which will make its deficit even greater?" These questions and many other "why's" should be answered by Congress, says Wayne A. Johnston, president of the Illinois Central.

●

For the second consecutive year, the nation's railroads have acted to move shipments of emergency hay into drought areas throughout the country at sharply-reduced rates. The rates, cut by 50 per cent, were filed by the roads as a measure of relief for drought conditions officially declared to exist in 700 counties and 15 states. Action followed a request from President Eisenhower and Secretary of Agriculture Benson, both of whom expressed appreciation for the carriers' prompt response and for their general contribution to the drought-relief program.

●

A $90 million damage suit has been brought against 85 major railroads and 4 key rail associations by Riss & Co., truckers, who charge the defendants with an organized campaign to ruin Riss' business. The suit stems from an application filed by Riss for authority to transport explosives in 34 states and the District of Columbia. Riss accuses the railroads and the other defendants of carrying on a campaign of "pure persecution" which it said was "instigated" at proceedings before the Interstate Commerce Commission starting in 1951. Subsequently, it is charged, the defendants conspired to have the Public Utilities Commission of Ohio bring a separate action to bar the company's trucks from Ohio roads, citing a record of safety and traffic violations.

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION

Of Railway Track and Structures published monthly at Bristol, Conn. for November, 1954

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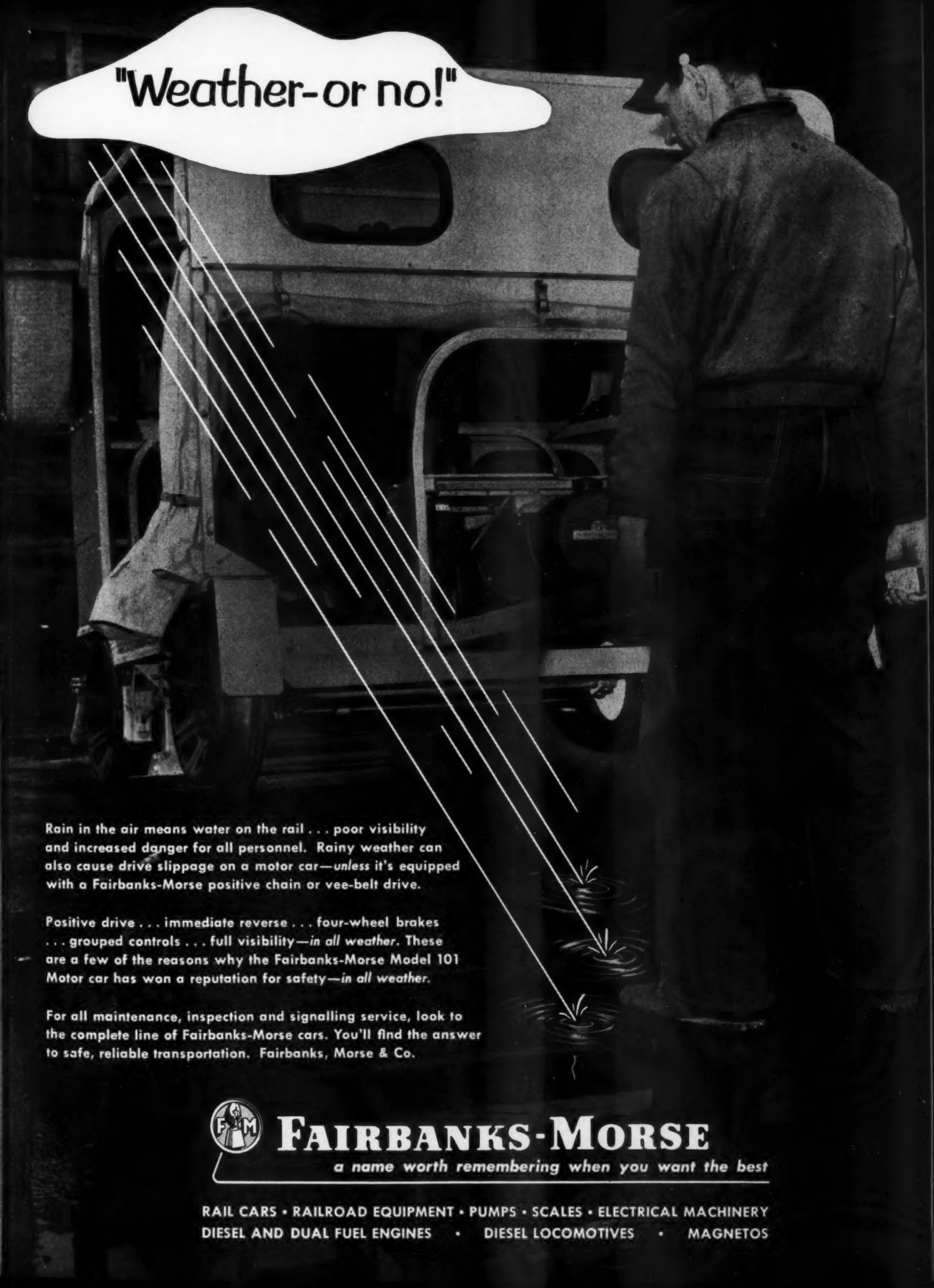
MERWIN H. DICK, Editor

Sworn to and subscribed before me this 29th day of September, 1954.

(Seal) RALPH E. WESTERMAN, Notary Public
(My commission expires February 3, 1957)


"Weather-or no!"
Rain in the air means water on the rail . . . poor visibility and increased danger for all personnel. Rainy weather can also cause drive slippage on a motor car—*unless* it's equipped with a Fairbanks-Morse positive chain or vee-belt drive.
Positive drive . . . immediate reverse . . . four-wheel brakes . . . grouped controls . . . full visibility—*in all weather*. These are a few of the reasons why the Fairbanks-Morse Model 101 Motor car has won a reputation for safety—*in all weather*.
For all maintenance, inspection and signalling service, look to the complete line of Fairbanks-Morse cars. You'll find the answer to safe, reliable transportation. Fairbanks, Morse & Co.
FAIRBANKS-MORSE
a name worth remembering when you want the best
RAIL CARS • RAILROAD EQUIPMENT • PUMPS • SCALES • ELECTRICAL MACHINERY
DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • MAGNETOS

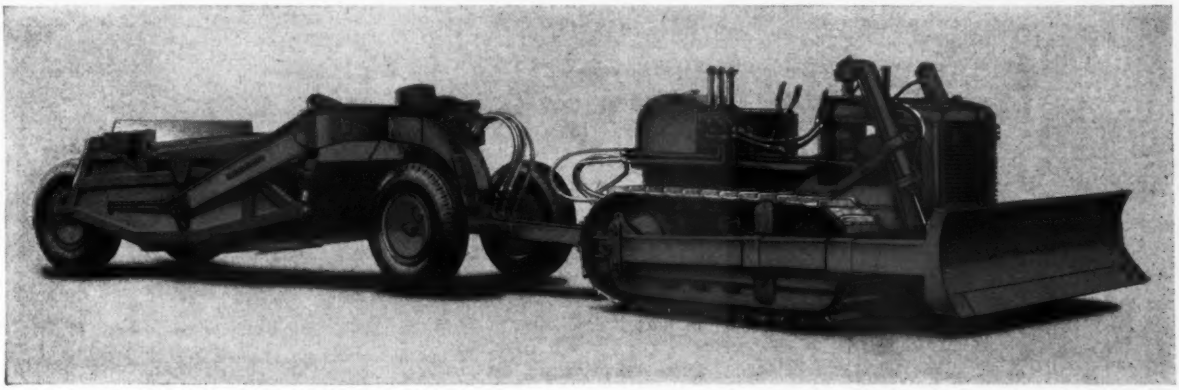
Allis-Chalmers HD-5 Tractor with dozer blade . . . plus 4-yd AC-44 Scraper—

RIGHT COMBINATION FOR VERSATILITY, LOW-COST DIRT MOVING

Cost-conscious railroads, general dirt-moving contractors and many others find the Allis-Chalmers AC-44 four-yard scraper and HD-5 Tractor with dozer an ideal equipment combination. It is large enough to get jobs done fast, small enough to work economically on even low-yardage jobs.

Working with either dozer blade or scraper, it is also versatile enough to be kept busy day after day on grading, filling, dozing, hauling, clearing, material handling, stripping and stockpiling.

For more facts about this versatile dirt-moving combination, see your Allis-Chalmers dealer. Let him *show* you its outstanding performance on a variety of jobs.



THE AC-44 SCRAPER

has plenty of features which contribute to low-cost dirt moving — wide-cutting edge and "center-boiling" action that loads quickly on short runs and with less tractor effort — high-flotation tires and ample ground clearance for easy travel with ground-hugging ability — high apron lift and forced ejection that takes less horsepower, dumps quicker and cleaner — full hydraulic control to speed production, simplify the operator's job.

Capacity: 4 cu yd struck; 4.7 cu yd heaped; weight, 6,595 lb

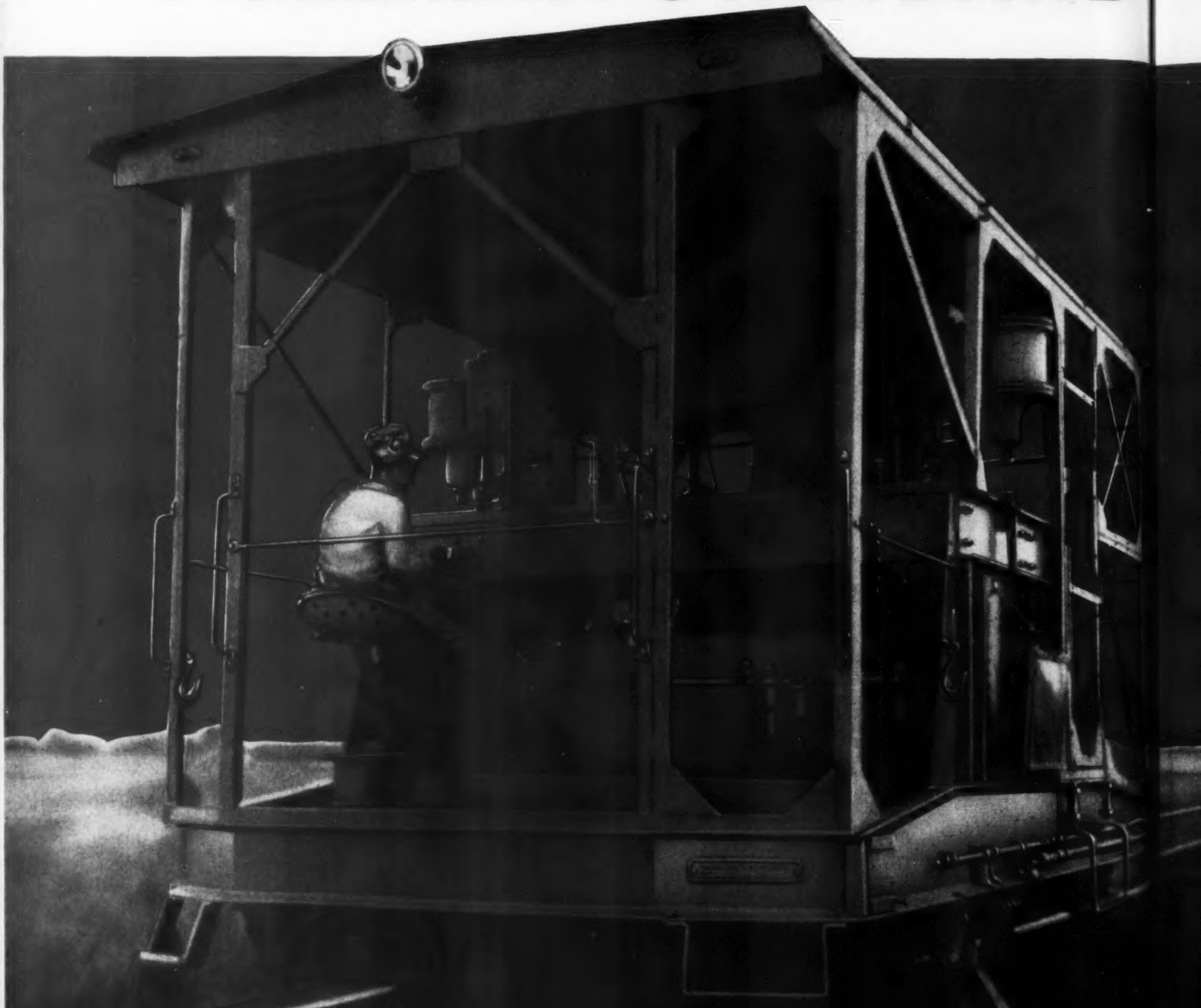
THE HD-5 CRAWLER TRACTOR

has *earned* its popularity, with tens of thousands of satisfied users. It has such modern tractor features as all-steel, box A-frame for long, productive life . . . unit construction that cuts service down time to a minimum . . . 1,000-hour lubrication intervals for truck wheels, idlers and support rollers that save up to 30 minutes' service time each day . . . extra large idlers and sprockets add traction.

Full 40 drawbar hp; 5 speeds forward to 5.5 mph; reverse 2.0 mph; weight (bare tractor) 11,250 lb

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

PULLMAN-STANDARD



Pullman-Standard Power Cribber— The Pullman-Standard Power Track Cribber gives two cribs a minute with a single operator. With a normal production rate of 150 to 400 track-feet per hour, its interchangeable 4-, 5-, and 6-inch digger tips enable it to crib efficiently and economically, regardless of cementation.

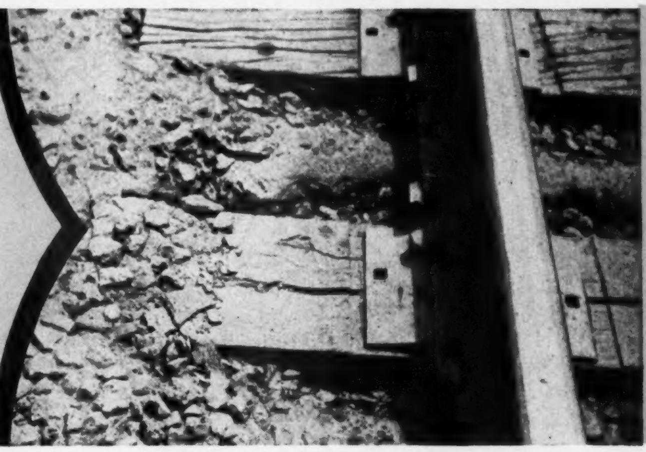
Pullman-Standard Power Ballaster— With a production rate of 500 to 700 feet an hour, a Pullman-Standard Power Ballaster, run by a single operator, can be efficiently manned by a crew of 10 to 15 men. Case history studies made on 16 railroads prove that this unit will give more feet of finished tamped track per hour, with less labor and maintenance, than any other production tamper.

Pullman-Standard Power Cleaner and Winch Car Team—For the first time both track shoulders can be cleaned simultaneously at 1000 to 1200 feet per hour with only four men. Even in multiple track territory, the shoulder plus half the six-foot are cleaned to a depth of eight to ten inches below the tie base at the same high rate and with the same low labor complement. Your ballast cleaning costs can be reduced by as much as 50%.

JACKSON TRACK MAINTAINER

THE ONE MACHINE THAT HANDLES ABSOLUTELY ALL TAMPING JOBS WITH EXCEPTIONAL UNIFORMITY, SPEED AND ECONOMY!

Smoothing and Spotting Under Hardest Conditions



Even when maintenance has been too long deferred the Jackson Track Maintainer will do a good job of spotting and smoothing. The Track Maintainer brings up the tie to the rail. Nipping is not necessary.

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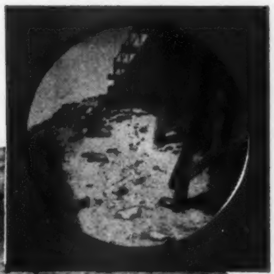

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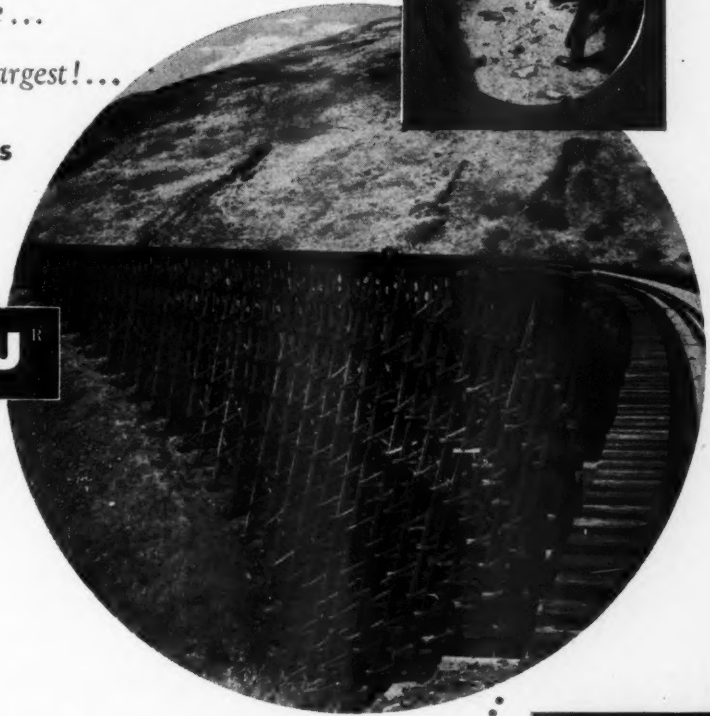

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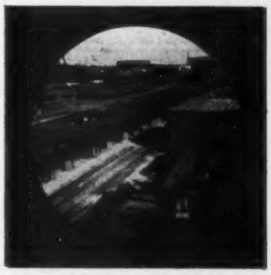

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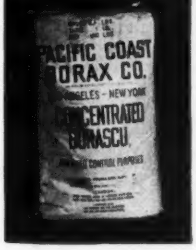

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RAILWAY

TRACK and STRUCTURES

Subject: **"Industries Within an Industry"**

Dear Readers:

Have you ever thought of the maintenance-of-way and structures departments of all the railroads as being an industry within an industry? I hadn't until our advertising sales department developed this concept for the purpose of emphasizing the advantages of the Simmons-Boardman publishing set-up in the railroad field. The more I think about the idea the more convinced I become that there is not only much logic in it but that actually there are benefits to be derived by all of us if we can get into the habit of thinking of our field in these terms.

As most of you know we have a "family" of four magazines in the railroad field, which, in their aims and functions, follow the natural division of the industry into four main spheres of readership, interest and buying power. The *Railway Age*, a weekly, is published primarily for management and administrative personnel, the policy makers of the railroad field. Then there are the three monthlies—*Railway Locomotives and Cars, Railway Signaling and Communications* and, of course, *Railway Track and Structures*—whose titles are descriptive of the major departments served by them. These are the only magazines published exclusively in the interests of their respective fields.

The sales department of our company pictures each of these publications as serving an industry in itself. For example, it visualizes the maintenance of roadway, tracks, bridges and buildings as comprising a "giant industry in railroading," which spends up to $1.5 billion annually for maintenance alone. Locomotives, cars and shops are seen as constituting an industry that spends $1.9 million each year, while signaling and communications, the "eyes and ears" of railroading, is described as an industry that makes expenditures of $140 million each year for new facilities and maintenance.

There is every justification for picturing these departments as being individual industries. Each of them purchases large quantities of materials, equipment and devices, and processes them in one way or another, again using machinery or equipment purchased specifically for this purpose.

In each of these "industries" many functions and tasks are performed which are encountered nowhere else in the industrial world. These require the development and use of special equipment, materials and skills, calling for a large body of specialized "know-how" knowledge. This is where our monthly publications come into the picture. Each of these magazines is dedicated exclusively to the proposition of disseminating this specialized knowledge in its particular "industry within an industry."

Our work as editors seems to take on added importance when we come to regard our phase of the railroad field as an industry in its own right. The concept of that field as constituting merely a department implies limitations of thought and action which are removed as soon as we begin to think of it as an industry. In my opinion our sales department has hit upon something of real significance—and usefulness—to all of us. MHD

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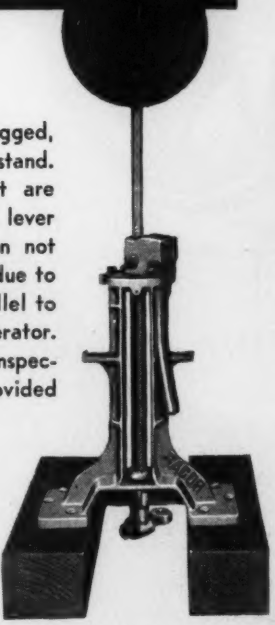

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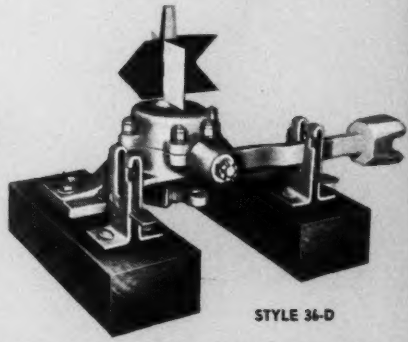

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RAILWAY

TRACK and STRUCTURES

November, 1954 Vol. 50, No. 11

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Are You Prepared for 1955?

With the year 1954 drawing to a close, the thoughts of maintenance of way and engineering officers are now preoccupied with the coming year. They are not sorry to see the present year become part of the past. Except on a few of the more fortunate roads, the money allotted for maintenance work has been disappointingly small, with the result that the amount of work accomplished was generally far less than that needed to keep the properties from deteriorating.

The year now fading into oblivion need not, however, be considered a total loss. On many roads further progress has been made in tightening the m/w organization to eliminate waste motion and to get more productive work from the maintenance dollar. Much has been added to the fund of available knowledge regarding how to make materials last longer, and the need for economy has spurred both railroad men and the manufacturers to more intensive activity in developing and perfecting cost-saving machinery.

One of the most encouraging developments is contained in the indications, cropping up here and there, that railroad management is gradually becoming convinced that true economy in maintenance can only be realized through long range programming.

As 1955 looms ahead each maintenance officer may well ask himself:

(1) Am I, within the limits of my jurisdiction, taking full advantage of available means for reducing the unit cost of work performed?

(2) Am I doing everything I can to convince my superiors, including management, of the advantages of carrying out adequate maintenance programs year after year even in the face of normal fluctuations in business activity?

Those who are unable to answer "yes" to both questions may not be fully prepared to make the most of the coming year's opportunities.

What's Happening to Ballast Cars?

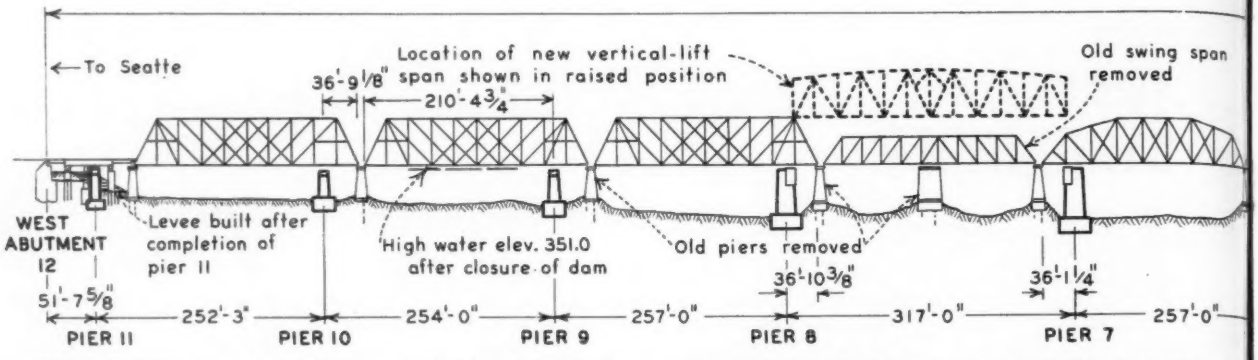
The decline that has occurred in the use of ballast cars in ballast service was spotlighted during the discussion of a committee report presented at the annual convention of the Roadmasters' and Maintenance of Way Association in September. Methods of Handling Ballast was the subject of the report. The discussion centered largely around the methods being used to unload commercial hopper-type cars which are being used in increasing numbers in ballast service, while ballast car use is declining.

A study of the available statistics shows that between 1941 and 1951 (the last year for which figures were available) the number of ballast cars on the Class I line haul railroads fell from 10,344 to 8,733. This trend, if projected at the same rate to 1954, indicates that there are now only approximately 8,400 of these cars still on the rails. This is a reduction of nearly 19 per cent from 1941.

The report of the committee and those who took part in the discussion seemed overwhelmingly in favor of the ballast car as a type of equipment that provides the safest, fastest and most economical means of handling ballast. Certainly these cars can be diverted to at least limited commercial use when not in ballast service.

The discussion brought out the fact that a high degree of ingenuity has been used in developing methods of unloading the commercial-type cars. However, these methods are necessarily of a makeshift nature, and it is recognized that ballast handling in this manner is more expensive.

It has been suggested that neglect in equipment maintenance, rather than obsolescence, is the primary factor behind the decline in the number of ballast car in service. Perhaps a firm stand by m/w officers in regard to the proper maintenance of this equipment might reverse the trend, and at least conserve the diminishing supply of these cars.



OLD FIXED SPANS were reused but were shifted longitudinally onto new piers and then raised 4 ft. Spans on each side of movable

Because of Government Dam . . .

2700-Ft. Truss

In carrying out a project involving the Northern Pacific's structure across the Columbia river at McNary dam, new piers were built and the entire bridge was shifted about 40 ft longitudinally to land the spans on them. Also, the center-bearing swing span was replaced with a vertical-lift span.

By J. E. Hoving
Assistant Chief Engineer
Northern Pacific, Seattle, Wash.

● Bring about a permanent and substantial raise in the water level at a long railroad bridge and you simultaneously raise the problems of how to maintain the waterway opening and how to protect the substructure against the greater buoyancy produced by the higher water level. These problems were faced by the Northern Pacific as a result of the construction by the government of McNary dam in the Columbia river, resulting in a 23-ft rise in the river at the railroads' bridge near Pasco, Wash. Traffic is now moving over the same superstructure (except for a new vertical lift span) supported at a higher elevation on new piers. How was it done?

The NP's Columbia River bridge at Pasco, a single-track structure carrying the road's main line between St. Paul and Seattle, was completed in 1888. It consisted of nine 250-ft through-truss spans, a 237-ft center-mounted drawspan, and two 50-ft girder spans at either shore, a total length of 2669 ft. In 1905 and 1906 the superstructure was reinforced and rebuilt to carry the heavier locomotives that had been placed in regular service. Since then, and until the recent project, only periodic maintenance work was done on the bridge.

The construction of McNary dam necessitated the altering of the railway bridge because of several considerations:

(1) The reservoir pool level has a water-surface elevation of 340 ft during normal times, which is 23 ft higher than the ordinary water-surface elevation of the river at the bridge prior to the building of the dam.

(2) During flood periods the water-surface elevation will be several feet higher than the extreme stage for which the bridge was originally designed or to which it had been subjected.

(3) The higher pool elevation would result in additional buoyancy and adverse effect on the stability of the river piers. When buoyancy and possible ice action and braking of trains were considered on the piers under the new conditions, it was found that it would be necessary either to strengthen the existing piers or construct new ones.

(4) To maintain the same clearance under the bridge during flood times it would be necessary to raise the bridge 4 ft 2 in.

Consider Several Alternatives

Several plans for altering the bridge were considered.

(1) Strengthen the existing piers.

This plan was rejected because of the large amount of riprap around the existing piers and the difficulty of driving piling and building cofferdams.

(2) Build new piers at the locations of the old piers.

This plan was rejected because it would have involved the placing of falsework under all the trusses to support them during the construction period. The difficulty of getting adequate penetration of the piles and the dangers of scour and possible collapse of the falsework during flood periods presented unfavorable conditions. The time element involved and the train interference which would result if this plan were used were other disadvantages.

(3) Build a new bridge at a new location in the vicinity of the existing structure.

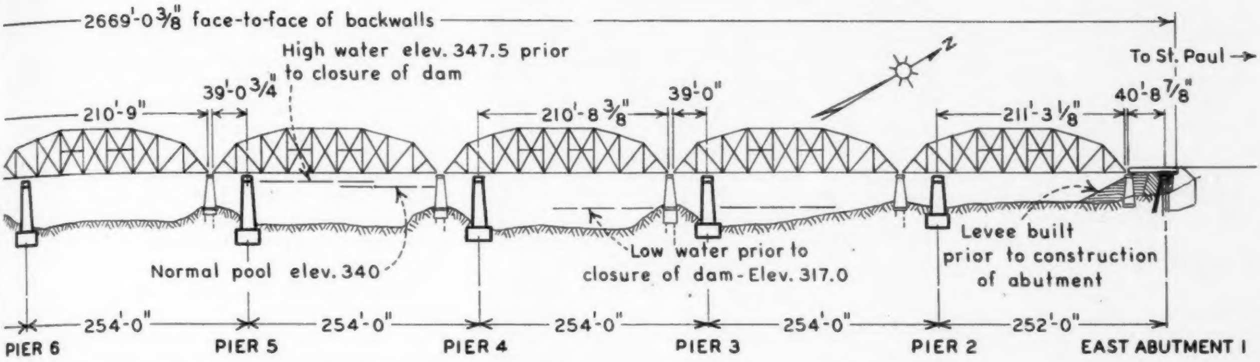
The cost and also the difficulty in obtaining such a large quantity of steel at that time were considerations that caused this plan to be abandoned.

(4) Remodel the bridge using the existing fixed truss spans on the same alinement but on new piers, and replace the existing swing span with a vertical lift span.

This was the plan adopted. It provided for new piers adjacent to the old piers, which reduced the hazard to the old structure and permitted the building of as many piers simultaneously as the contractor was capable of handling. It also required very little falsework and left the river free of any large obstructions. With the lift span in place and the old pivot and drawspan piers removed there is a horizontal clearance in the navigation channel of 290 ft, which should be adequate for all future river navigation.

With the final plan of procedure approved detail plans were prepared and contracts awarded. Contracts for both the substructure and the superstructure work were awarded to Kansas City Bridge Company and Massman Construction Company, Kansas City, Mo., on the basis of their low bid. Work was started by the contractor on the substructure work on May 12, 1952, and the superstructure work was begun on April 1, 1953.

The stream bed at the bridge site



span were shifted in opposite directions, thereby providing larger opening for new vertical lift span.

Bridge Is Raised 4 Ft.

consists of a layer of 3 to 15 ft of sand and gravel which overlays the Ringold formation. This formation, a brittle blue-gray clay-like material, which is firm and non-plastic, is of wide distribution in this area. It is the material in which the piers were landed. It cannot readily be excavated with the usual clamshell bucket but can, in general, be dug with air spades or similar equipment without blasting. It was found that as a rule, the Ringold formation would stand vertically without sloughing so that at some of the piers it was possible to excavate the material on the neat line of the pier footings and pour concrete in the excavation without the usual forms. Generally, excavation for the piers was stopped after a depth was obtained in the Ringold of 8 ft for the fixed-truss piers and 10 ft for the lift-span piers.

How Substructure Work Was Done

The original plan of construction provided for lift-span Piers 7 and 8 (see drawing) to be built using pneumatic caissons, while the open-cofferdam method was to be used for river Piers 2, 3, 4, 5, 6, 9, 10 and 11. The use of pneumatic caisson construction at Piers 7 and 8 was necessary due to the proximity of the existing end piers of the old swing span. As the bases of these new piers were larger than those of the piers, excavation operations were very close to the old pier footings and consequently would endanger the stability of the old piers if the open cofferdam method were used. With the use of pneumatic caissons excavation operations can be carried on with very little disturbance of the river bed outside the area of the caisson. For Piers 7 and 8 the caissons were of steel construction 36 ft wide and 72 ft long, high enough to provide a working space of 7 ft and with sides so made that a removable timber cofferdam could be attached.

When work was started on Pier 3 for open-cofferdam construction the contractor experienced considerable difficulty in driving steel sheet piling through the sand and gravel of the river bed. Progress was very slow and it became evident that, if the pier work was to be completed by the deadline date of April 1, 1953, it would be necessary to resort to another method of construction. Consequently, it was decided to use the penumatic cais-

Shifting a span

1 SKID-FRAME arrangement has been installed at end of span to bridge openings between new and old piers.

2 FORTY-FOOT temporary girder span previously installed to span between new and old piers is removed by derrick car.

son method for Piers 3, 4, 5, and 6, which increased the costs by a quarter of a million dollars.

All of the substructure work was carried on without any serious delays to trains. Also, there was no evidence that the old piers lost any of their stability during construction of the new piers.

These Steps Remained

With the completion of the concrete piers the following work remained to be done:

(1) Remove one 50-ft and one 40-ft girder, and move one 50-ft girder to a new location.

(2) Move 9 steel trusses, each 250 ft long and weighing 500 tons, to new piers 41 ft away longitudinally.

(3) Replace the old 237-ft swing span with a 307-ft vertical lift span.

(4) Raise the entire bridge structure 4 ft 2 in and raise the approaches correspondingly.

All of this work was completed under conditions permitting maintenance of railroad traffic with as little delay as possible. Fortunately, train schedules permitted a train-free period between 11 am and 3 pm so that, by carefully planning the work, there was very little if any train delay.

How Trusses Were Moved

The procedure for moving the 500-ton truss spans was similar in each case. The first one to be moved was the one at the Kennewick (west) end of the bridge. A temporary bridge structure, called a "skid-frame," was erected at each end of the truss, spanning the 41-ft openings between the old and new piers. Longitudinal skid rails were placed on top of the skid frame. Previously, skid rails and rollers had been placed under the bridge shoes to line up with the rails on the skid frames. A block-and-tackle arrangement was placed for use in moving the span the 41 ft endways. Prior to the time set for moving the span arrangements had been made with the train dispatcher's office at Spokane for a train-free period of 4 hours between 11 am and 3 pm.

A locomotive crane and a derrick car were used in the moving operation. The locomotive crane arrived first and was stationed on the approach at the west end of the bridge. The derrick car came out next and proceeded to remove the 40-ft girder at the Kennewick end of the westerly truss span. The locomotive crane was then coupled to the block-and-tackle arrangement and movement of the truss span was begun. The actual moving time for the truss span was 20 min.

In the meantime the derrick car had moved to the Pasco (east) end of the truss span with the temporary girder for placing in the opening at that end. This was accomplished soon after the opening was made available at 11:15 am, and the bridge was again ready for traffic at 2:15 pm, or 3 hr later.

All the moves were similar in procedure except that it was possible to cut down the track out-of-service-time to as low as 1 hr 45 min.

As the moving of each span was accomplished preparatory work was begun for the next move by dismantling and re-erecting the skid-frame structure. All of the truss-span moving was accomplished without incident. When the span moving had been completed all of the fixed truss spans were resting on the new piers while the swing span remained in place on the old piers. A temporary 40-ft girder span extended between each end of the swing span and the adjacent fixed-truss span on the new pier.

The original plans called for the placing of the lift span as the next step, but non-delivery of critical steel sections to the fabricator made necessary a change in plans. Instead of raising the bridge uniformly for the total raise of 4 ft 2 in, it was decided to raise the first three spans on the Pasco side to the full height and raise the others on a "run-off" down to the drawspan, and raise the Kennewick end of the last fixed-truss span to full height and incline from there down to the drawspan. For a long time there was a "saucer" looking type of structure, but with apparently no adverse effects on train operation.

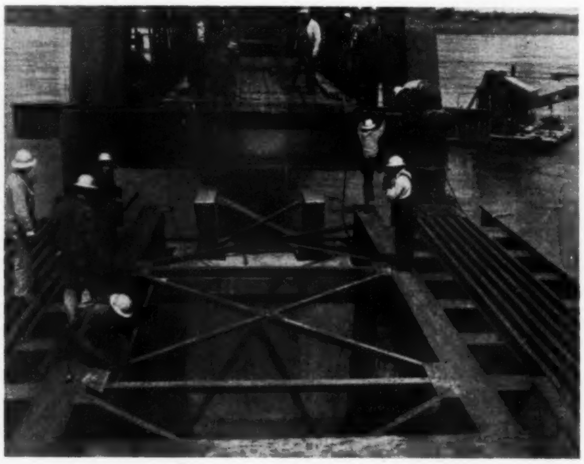
With the raising of the bridge at each end it was possible to raise the approaches and do other miscellaneous work attendant to the raising operation.

The truss spans were raised in 10-in increments. Hydraulic jacks of 115 tons capacity, four to a span end, were used in the raising operations.

The full 10 inch raise was obtained by raising 1 to 1½ in at a time and then placing blocking under the bridge shoes until the other side of the span had been raised a like amount, and, in addition, raised 1 in or 1½ in above the other

Shifting a span

3 TRUSS SPAN on way to new piers. Note men placing rollers on skid rails. Same process is going on at other end.



4 THIS VIEW, taken at opposite end of span from that shown in picture at left, shows gap between it and adjacent span.

end. The full raise of 4 ft 2 in was accomplished without incident.

The vertical-lift span, weighing 1100 tons, was assembled on a temporary pile trestle placed downstream from the railway bridge on the Pasco side. It was assembled as complete as possible on the erection trestle to cut down the time the bridge would be closed to navigation after the lift span had been placed in its final position. All machinery and control devices were installed to the extent possible prior to moving the lift span into its final position.

To take out the old swing span four barges were used and the same number of barges were used to move the new lift span in place. The switchout of the existing swing span for the new vertical-lift span was accomplished on August 9, 1954.

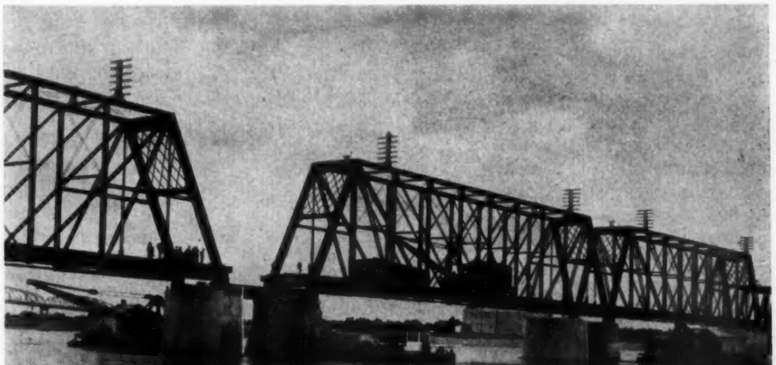
VERTICAL LIFT SPAN, supported on barges, is being floated into position.

Spans Moved in 12 Hours

Monday was the day selected for the changeover operation as that day would cause the least disturbance to the handling of fruit trains from the Yakima valley. Twelve hours of free train time was requested to begin at 5 am. Two scheduled passenger trains due to leave Pasco at 10:45 am were detoured over the Union Pacific to Kennewick. Time freights which would normally cross over the Columbia river about mid-morning were run ahead of schedule, and by 5:15 am of August 9 all trains scheduled to use the bridge had passed over it, and the switchout of the movable span could begin.

First the two temporary spans were removed. Pumps were then started on the four barges under the existing swing span and soon it was clear of the center-pin connection on the pivot pier. Two large river tugs were connected to the barges and moved the swing span downstream from its position in the bridge. When sufficiently clear of all downstream obstructions the span was moved to a temporary location on the Pasco shore for dismantling. The river tugs were then attached to the barges under the vertical lift span and, as the barges were unwatered, the lift span was raised free of its supports on the temporary construction trestle.

Movement of the span to the permanent location was accomplished without incident. When the span was in a position close to the bridge, cables through snatch blocks were attached to the lift span and to the locomotive crane and derrick car on the bridge for moving the span into final position. By noon the lift span was in position but still resting on the barges. By pumping water into the barges the span was lowered onto its bearings, after which the barges were removed. The tower-span girders were then installed and ties and rails were placed for track connections at the ends of the lift span. By 5:15 pm the bridge was ready for train traffic. About a week's work was required to place the vertical lift span in operation as all necessary mechanical and electrical connections had yet to be made.



5 TRUSS SPAN at left in this view has just been shifted and 40-ft temporary girder span will now be inserted to fill gap until next span is moved.

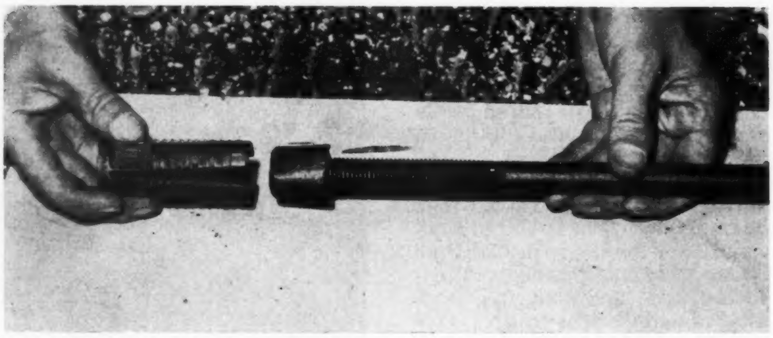
Final Work

The work remaining to complete the project required about two months to complete. This consisted of raising the six truss spans to the final height, the setting of the vertical lift span to meet the final elevation of the truss spans, and the encasing in concrete of the steel grillages that were placed on the piers during the raising of the truss spans.

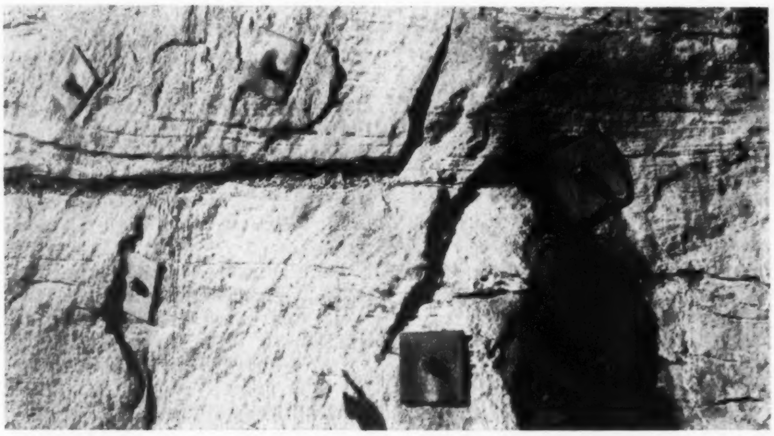
The consulting engineers for the bridge work were Howard, Needles, Tammen & Bergendoff. For the railway company, the author was in charge of the entire project, including the construction of new branch lines, rehabilitation of track, and other work required by the construction of McNary dam. M. O. Woxland, assistant engineer, was in charge of the bridge work. C. E. Ekberg, bridge engineer, St. Paul, reviewed and approved all plans prepared by the consulting engineer. He also handled all questions in connection with actual construction.

Harry Pyle was superintendent for the contractors, and was responsible for the successful handling of this complicated job.

ONE TYPE employs a bolt with slotted end which is driven down onto a wedge to spread end of bolt against side of hole for anchor.



OTHER TYPE of anchor bolt features an expanding shell anchoring device into which a wedge on end of bolt is driven, thus forcing shell against side of hole.



ANCHOR BOLTS were placed on faces of cuts in various patterns based on the amount and type of support required. Some were 8 ft long.

Using Anchor Bolts, The UP Learns . . .

. . . How to Stop Slides in Rock Cuts

Water seepage into thin layers of clay in two deep granite cuts caused a slide hazard on a new Union Pacific line until rock anchor bolts were applied to secure the cut faces.

● No slides or cracks now, reports the Union Pacific, after installation of rock anchor bolts on the faces of two deep cuts on the road's new Cheyenne-Dale line in Wyoming. In these cuts the UP recently installed 131 of the bolts, varying from ¾-in to 1½-in in diameter, and from 4 ft to 8 ft in length, to retain loose rock formations which threatened to slide onto its roadbed below.

In locating the new line, which was constructed during 1952, it was necessary to excavate the two cuts, one 165 ft deep and the other 120 ft deep, through solid granite. The cuts were excavated with slopes of ½ to 1, and at first caused no particular trouble. However, during, and for some time following, the construction of the line there had been little precipitation in that vicinity. Trouble first began during this past year following rains when moisture seeped into thin layers of clay inlaced in the granite. A few small cracks developed and gave indication of more serious complications to come.

In an effort to retain loose formations which had developed and prevent further cracking, the UP decided to apply anchor bolts at strategic points along the cut faces. Workmen using jack hammers, and supported by safety belts and ropes, drilled holes for the bolts at required points along the rock walls. Air compressors were placed on top of the cuts for supplying air for the drilling operations. Two men usually worked together on each hole and were able to progress at the rate of about 4 ft per hour using a 1½-in drill bit.

Spacing of Bolts Varied

No definite pattern was used in placing the bolts. The job foreman studied the rock structure as the work progressed to determine where support was needed. In some instances the bolts were placed as close together as 12 in, center to center in all directions, while in other locations one row of bolts at 2-ft centers was considered sufficient.

Two types of bolts were used. One type, supplied by the Colorado Fuel & Iron Corp., consists of a long steel rod, threaded on one end and slotted on the other. A steel wedge is dropped into the hole and the slotted end of the rod forced down upon the wedge with a pneumatic hammer so as to spread the end of the rod and secure it in

ROCK CUT, 165 ft deep, on UP's new Cheyenne-Dale (Wyo.) line. Upper portion of slope at right was widened, thus forming a protective shelf about midway up slope. Anchor bolts are installed on cut face between shelf and track level.

the rock. A steel plate is placed over the threaded end of the rod and against the outer face of the rock formation. A nut is then applied to hold the plate firmly against the rock face.

The other type, known as the Type C anchor bolt, was furnished by the Bethlehem Steel Company and consists basically of the same type of rod, plate and nut on a threaded upper end. However, the lower end of this rod is also threaded and is anchored by an expanding shell. A wedge screwed onto the end of the rod is driven into the shell thus forcing it tightly against the side of the hole in the rock face.

After the bolts were secured, the cavity around each rod was filled with molten lead to prevent moisture from collecting in the holes. This eliminated the danger of freezing and cracking of rock adjacent to the bolts.

Shortly after the anchor bolts were installed on the faces of the 165-ft cut a widening crack was discovered on top of one side of the cut above the surface secured by the bolts. Because this presented a definite hazard to train operations, the road decided to widen the cut on that side. Approximately 150,000 cu yd of rock were removed from the faulty slope in a shelf pattern. The upper portion of the cut was widened considerably down to a point about half way between the bottom and top. At this midpoint a shelf was made in the form of a small plateau. By constructing this shelf the danger of rock slides from above ever reaching the track was reduced.

An example of the strength and effectiveness of the anchor bolts was afforded during this cut-widening operation. Extensive drilling and blasting was necessary during removal of material from the upper portion of the cut, but the UP reports that at no time during these operations did any rock fall where anchor bolts had been applied. At points where anchor bolts had been installed previously and rock was to be removed as part of the widening project, it was necessary to cut the bolts in order to excavate the rock. Approximately 30 per cent of the original anchor bolts applied on that slope were retained after the cut had been widened. Since the widening project was completed no new cracks or slides have been reported at that location.

The application of the anchor bolts on this project was conceived by and carried out under the general direction of W. C. Perkins, chief engineer. Mr. Perkins had noted anchor bolts in use as ceiling supports in coal mines of the Union Pacific Coal Company and in the Weber (Utah) water supply tunnel of the Bureau of Reclamation. Construction of the Cheyenne-Dale line, including application of the bolts and subsequent widening of the 165-ft cut, was performed by the Morrison-Knudsen Construction Company.

What Causes Slippery Rail?

Laboratory and field studies bring out these points:

By R. K. Allen

Locomotive and Car Equipment Department
General Electric Company, Erie, Pa.

(1) Adhesion is low where surface is not "wettable".

(2) Condition is caused by an extremely thin oil film.

(3) Film is caused by oil from journal box leakage.

(4) Weather may cause film to appear or disappear.

● Wheel slip occurs on rails most often in cuts and shaded areas, and is especially frequent in fog and misty weather. The onset of rain is a slippery time, but heavy continued rain gives good rail traction.

What is this seemingly anomalous behavior of nature? Actual adhesions developed by locomotives in the field have been measured as high as 42 per cent and as low as 12 per cent. What figure should be used? Common practice has selected the mean (25 to 30 per cent) as a design basis.

Laboratory Studies

To answer some of these questions, an investigation was undertaken. It began in the laboratory with an attempt to duplicate rail and wheel adhesion. The first efforts were directed toward determining the effects of rust films on adhesion. Rust films, varying from a mere trace to a deep reddish brown, were allowed to form on the flat test plate. None of them was found to be slippery. In general, the heavier the rust film, the higher the adhesion. The conclusion reached was that the rust film did not withstand 75,000 psi and, therefore, was not the slippery element for which we were looking.

During and following the rust film investigation, uniform breakaway adhesions could not be obtained when the test plate was in a supposedly clean and polished condition. The breakaway adhesion varied from 35 per cent to 10 per cent with no apparent difference in the plate surface.

At first, there seemed to be no good explanation of this phenomenon. Repeated measurements were made while attempting to control all factors in the preparation of the plate surface, such as degree of polish, cleanliness, and the time interval between polishing and making the measurement. After considerable investigation, a definite pattern began to appear between adhesion on the plate and the ability to wet it with water. When the plate surface would not wet with water, adhesion was low. Conversely, when the surface was wettable, adhesion was high. While an electroplating expert would have immediately spotted this tell-tale sign of film contamination, we were slower in recognizing it.

Oil Creepage the Culprit

Then the question arose, what was this contamination? Several weeks of mystery surrounded the happenings on the surface of the plate until it was realized that oil from hands was the culprit.

The next question was, how does this creepage occur? Further investigation showed that one fingerprint on the highly polished steel surface, when moistened, was capable of spreading an invisible film over the entire plate surface. This reduced adhesion from 35 per cent to 15 per cent, even with 75,000 psi contact pressure. The difficulty in our cleaning method had been that in polishing the plate, the fingers touched its edge. When the polishing grit was rinsed from the plate, the water spread over the surface and reached the fingermarks.

The oil in the fingermarks consequently displaced the water from the plate surface and left an invisible oil film which prevented wetting of the plate.

The next step was to investigate the effect of using different oils. The same result was produced with a spot of whale oil, and with partially degraded (oxidized and volatilized) oil samples taken from rail heads. In each case, a minute quantity of the oil sample, when contacted with water, would creep over the entire plate and drastically reduce adhesion even though the contact pressure was 75,000 psi. In contrast to this, fresh machine and lubricating oil samples would float to the surface of the water, giving a rainbow-colored hue, but would not displace the water film by creepage action.

As mentioned, creep films have breakaway adhesions as low as 15 per cent. If a surface contaminated with such a film were rubbed with a cloth, the adhesion dropped as low as 10 per cent. This rubbing action evidently tended to make the film more uniform and continuous. These films are capable of withstanding extremely high pressures without breakdown.

Studies Move to the Field

The wear band on main-line rail is a highly polished surface. It was found that on sunny days, this surface could be wetted with water. On some cloudy days, however, especially when the relative humidity was high, it could not be wetted. Following a heavy rain the wear band was always wettable and generally rust speckled. On particularly damp mornings when the band was not wettable, a greyish streaky discoloration would sometimes appear. A sample of this film was wiped up with filter paper and analyzed as follows:

86 per cent—Moisture
14 per cent—Residue (Oil—14 per cent; iron—5 per cent to 20 per cent estimated; silica—most of remainder; copper—trace.)

High percentage of water indicated that rail temperature was near the dew point. The residue was mostly iron and silica. This is accounted for by wear, and the fact that the track was frequently sanded since the location was on a 2 per cent grade. It is significant that 14 per cent was oil.

The next step was to correlate wettability of the wear band with adhesion. For this study, a modified version of the laboratory device was used.

Rail adhesion was found to be higher when the wear band was wettable, and lower when it was not wettable. Particularly low values were found whenever the measurement was made in the vicinity of oil deposits on the rail on a cloudy, damp morning.

With the conclusion fairly well established by these readings that moisture-propagated oil films are a major cause of wheel slip, actual observations from the engine cab were undertaken. More than 1,500 miles of riding in mountainous territory cemented this belief.

Subsequent track inspections showed that 90 per cent of the slips occurred on curved track, at road crossings, switch points, frogs and crossovers, where oil deposits were present on the rail outside the wear band. An example of this is the buildup on a switch frog, which is shown in one of the illustrations. At switch points a similar buildup occurs on the stock rail.

Source of Oil Deposit

The next question to be answered was, how does this oil deposit get on the rail? The outside face and outer portion of the tread of many car wheels are soaked with journal oil leakage. Normally, the outer portion of the wheel tread extends beyond the rail head and hence does not contact it. At frogs, switchpoints, and crossovers, however, this oily portion of the tread comes into contact with the rail and lays down a deposit of oil.

A similar occurrence takes place on wide-gage curves. Car wheels entering the curve tend to shift toward the high rail. This causes the oil-soaked portion of the tread to contact the outer edge of the low rail and results in oil deposits, especially when the low rail is peened or badly flowed. If the gage exceeds 57 in the oil deposit becomes pronounced. The condition at road crossings is mainly oil contamination from highway vehicles.

Some curved track showed adhesions as low as 14.5 per cent, when measured from motor torque at 11 mph train speed. A definite relationship was also observed between the number of slips and weather conditions; damp, misty nights produce the most slips.

How then does this cyclic appearance and disappearance of track film take place? Traffic and heat (such as sunlight) destroy the invisible film on the wear band. Without this film high adhesions are present. When a sudden rise in relative humidity takes place, the rails approach the dew point. This may be the result of the onset of rain, cool evening air in the mountains or low lying areas, etc.

If the rails reach the dew point, a thin, invisible, water vapor film forms on the wear band. As this film extends to the edge of the rail, it may contact a partially oxidized oil deposit. As soon as this occurs, a thin, invisible creep film of oil replaces the former vapor film. Now the wear band is covered with a thin invisible oil film capable of withstanding pressures in excess of 75,000 psi.

The smoother the surface, the more easily creep action will form this film. For this reason, the wear band on the rail—especially the highly polished manganese steel in frogs, crossovers, and other special work—is particularly susceptible to this film formation. The oil deposits act as reservoirs for the formation of the film. Heavy rain causes these films to attempt to extend themselves to infinity and in this way exhaust the available creep oil supply on the outer edge of the rail. Therefore, a heavy rain acts as a scavenger of creep oil from the rails and so restores good adhesion.

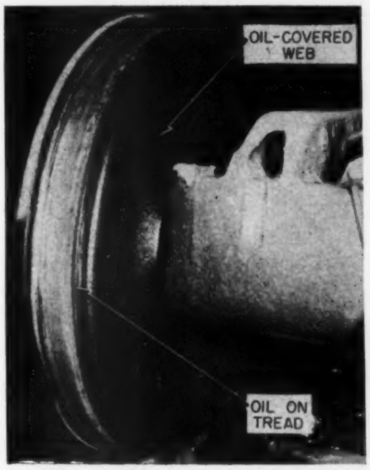
Static adhesion on these invisible creep films on the wear band has been measured as low as 16 per cent. In cases where the wear band has been covered with visible oil deposits in a partially degraded state, static adhesion as low as 10 per cent has been observed.

This cyclic formation and destruction of wear band films accounts for the mystery of changing adhesion factors on the same rail. Sections of rail have been observed where the breakaway adhesion factor was between 35 and 42 per cent in the middle of a sunny afternoon. This same rail at 5 a.m. on a misty morning has had an adhesion factor as low as 16 per cent.

Conditions are especially bad after several weeks of dry weather, since warm dry weather enhances the build-up of oil deposit reservoirs on the rail head. All that is required is for moisture to form on the wear band. This will spread a creep film on the rail and reduce adhesion so drastically that maximum tractive force cannot be sustained at lower train speeds.

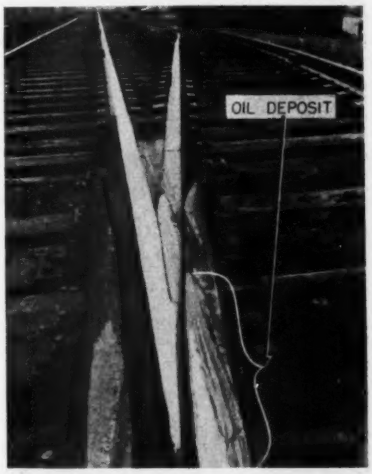
An understanding of the phenomenon of fluctuating rail adhesions has paved the way for an investigation of possible remedies. Work is being carried on to develop means to remove and prevent the oil film formation.

How it happens . . .

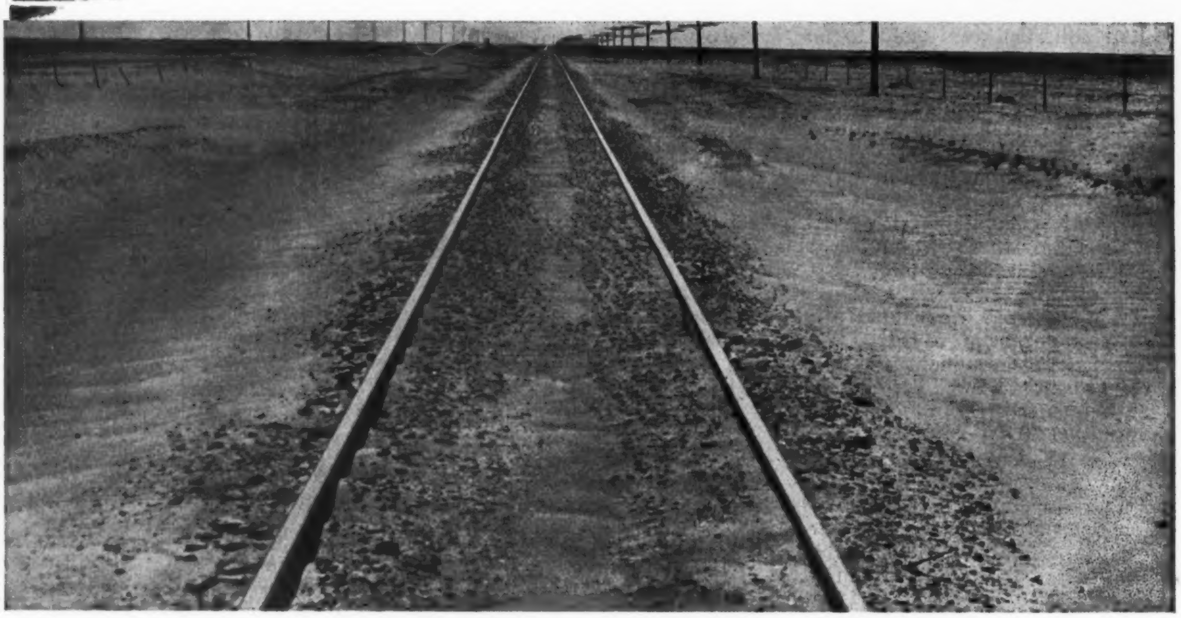


JOURNAL oil on wheel web gets to outer portion of the tread from where . . .

OIL is deposited on edge of low rails on curves where gage is wide, and at . . .



FROGS and switches, but does not normally contact rail on tangent track.

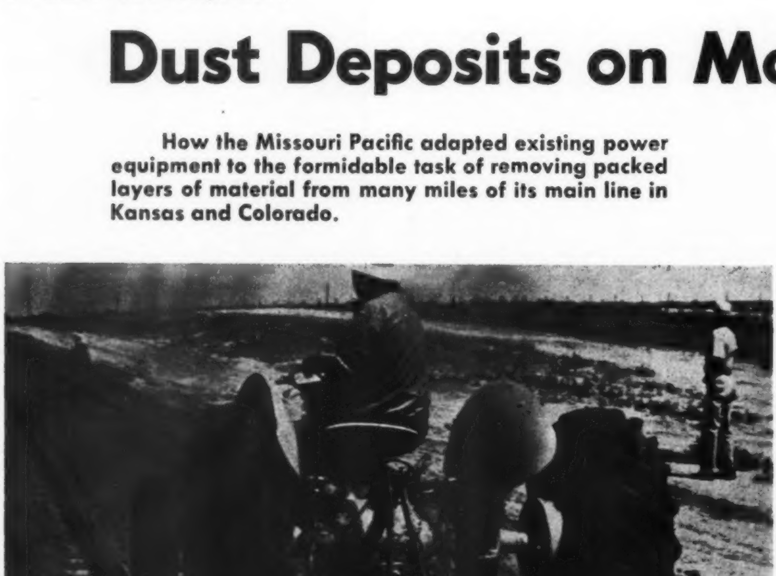


FORTY-THREE miles of track were covered with wind-blown layers of sand and soil packed into a hard mass.

THE PROBLEM:

Dust Deposits on Main Track

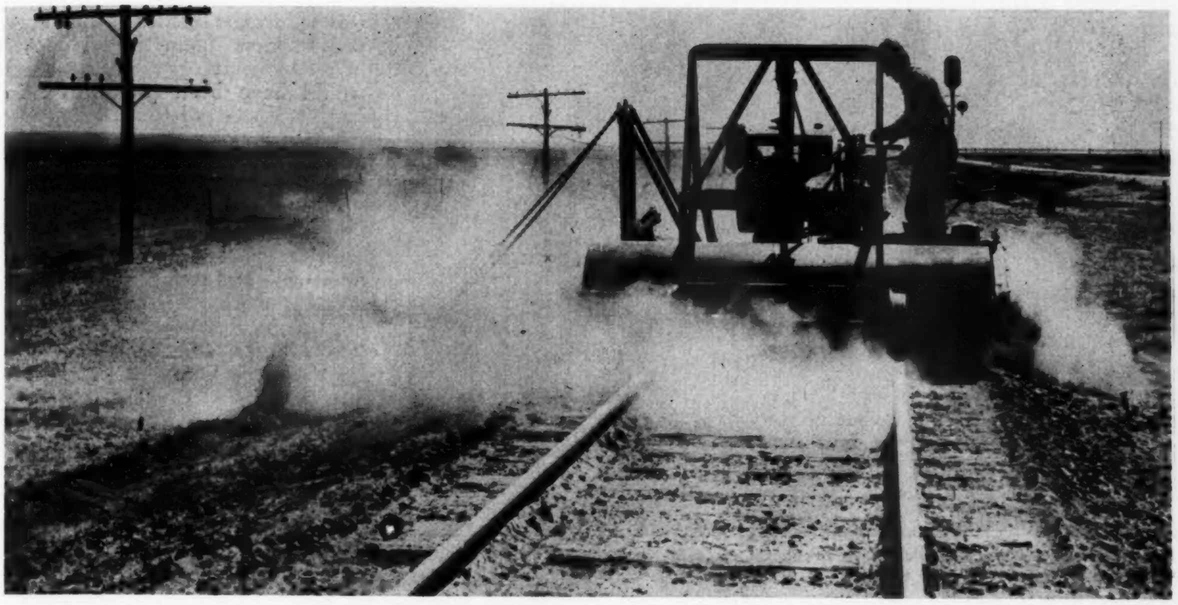
How the Missouri Pacific adapted existing power equipment to the formidable task of removing packed layers of material from many miles of its main line in Kansas and Colorado.



SCARIFIER, drawn by wheel-type tractor, loosened material ahead of broom.

• Take nearly 50 miles of track, cover it with sand and dirt to a depth in places almost to the top of the rails, pack it down firmly—and you have the recipe for a track-cleaning problem of the most difficult nature. But that's exactly what faced the Missouri Pacific earlier this year along a portion of its single-track main line in the so-called "dust-bowl" territory of the 'thirties—western Kansas and eastern Colorado. Only by taking advantage of the availability of several types of power equipment, notably a mechanized track broom, was the railroad able to avoid an excessive expenditure for removing the dust, as well as considerable delay in getting the job done.

The territory involved is the road's main line extending westward from Kansas City to points in Colorado. Rainfall last winter was far below normal in the territory traversed by the western portions of this line. When the spring winds began to blow the dried-out top soil was lifted in clouds reminiscent of the dust-bowl days of 20 years ago. The rails of the Missouri Pacific's main line through the territory, which is very flat with shallow cuts and fills, provided an ideal place for catching and holding the flying dust. The result was that



SWEEPING action is performed by cylinder containing 140 steel bristles, which delivers dirt to transverse conveyor.

THE SOLUTION:

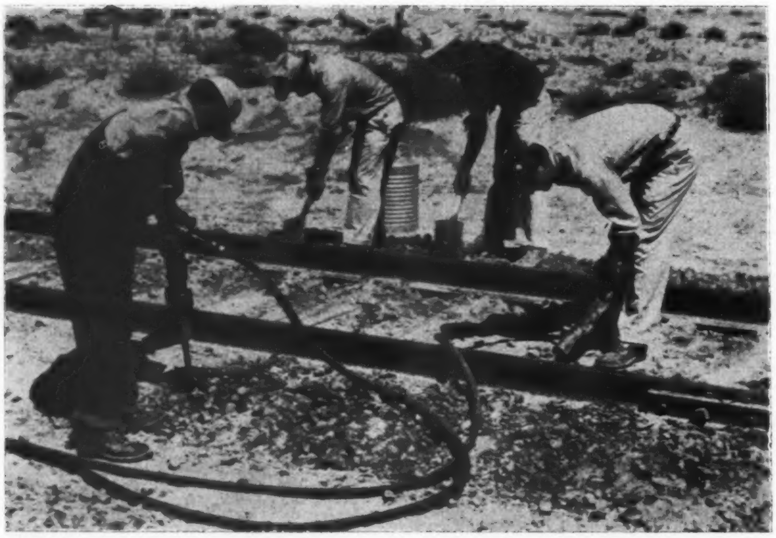
Power-Driven Rotary Broom

heavy deposits of the dust were built up between and outside the rails at many locations. This just wasn't loose dirt that could be easily removed; it became packed into a hard mass that was reported to have almost the "consistency of concrete."

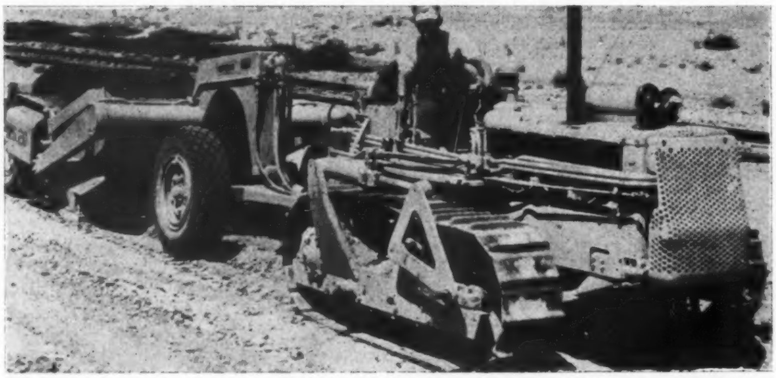
These dirt deposits occurred largely in the territory between Scott City, Kan., on the east and Sugar City, Colo., on the west. This is a distance of about 160 miles. The dust-covered stretches, totaling about 43 miles in length, were scattered throughout this territory. Officers of the railroad point out that the plowing of land adjacent to the tracks greatly multiplied the troubles from wind-blown sand and soil. Where the adjacent land was not plowed the difficulties were reported to be of a minor nature as a rule.

It was imperative that the dust be removed as quickly as possible. This was not only necessary in the interest of economical track maintenance, but there was danger that a heavy rainfall might cause water to accumulate between the rails on top of the packed dust, thereby interfering with the track circuits. In facing this problem, A. B. Chaney, assistant chief engineer-maintenance, and his associ-

TRACK after being swept. Next step was to clean "eyes" under rails.



PNEUMATIC forks were employed to break up material under rails. Le Roi Tractair was used for furnishing air.



OFF-TRACK equipment, such as this Caterpillar tractor-drawn scraper, was used to remove material from ditches and right of way generally.

ates, were only too keenly aware that removal of the dust by hand methods would not only be excessively costly but would be a time-consuming job. The problem, therefore, resolved itself into one of finding suitable mechanical equipment for removing the material.

The road had heard of the Kershaw Track Broom and determined to see whether it could be used to advantage in connection with the dust-removal problem. One of these units was obtained on a trial basis. This machine, which is described in detail in an accompanying column, has a rotating cylinder covered with replaceable steel bristles, which performs the sweeping action. The rotary brush, together with a transverse conveyor for disposing of the material swept up, and the power plant, are carried on a self-propelled, four-wheel, track-mounted carriage. The unit is operated by one man.

Early experience with the track broom indicated that best results would be obtained if the packed material is first loosened. For this purpose a homemade scarifier drawn by a tractor was developed and put to use. After some modifications to fit the extremely rugged service, the track broom was reported to perform satisfactorily in removing the accumulated material between the rails and outside of them to the ends of the ties, the material removed being deposited in a windrow well outside the track section. After the first track broom had been in service for about 30 days, another unit was acquired, also on a trial basis. The second machine incorporated changes and improvements based on observation of the first unit in operation.

There was still one knotty problem that remained to be solved. This was the removal of the packed accumulation of dust underneath the rails and between the ties. This material, of course, could not be reached by the bristles of the rotary broom. Here again the labor cost of removing the material by hand would have been prohibitive. In fact, it was found that 2½ hr were required for one man, using a pick, to remove this material from underneath the rails in a 39-ft panel.

Power equipment again proved the answer to the problem. Ingersoll-Rand pneumatic tamping guns, fitted with two-pronged forks, were found to work effectively in breaking up the dirt accumulations underneath the rails. Eight of the forks were acquired for this purpose and were divided into two four-tool outfits, each of which included a LeRoi Tractair for furnishing the air.

Following behind each of these outfits, a man with a shovel raked the loosened material out beyond the ends of the ties. A Fairmont drainage car was then employed to push it out beyond the ballast shoulders.

G. L. Brown, division engineer of the Central Kansas and Colorado divisions, with headquarters at Osawatomie, Kan., had general supervision over this work. O. J. Sterlin, roadmaster at Scott City, and J. E. Padgett, roadmaster at Pueblo, Colo., were in direct charge of the work.

Facts About the Kershaw Track Broom

A rotating steel cylinder, 30 in in diameter and 9 ft long, studded with 140 replaceable bristles consisting of lengths of ¾-in cable, is the "business end" of the Kershaw Track Broom. Material picked up from the track by the broom is swept into a transverse conveyor which may be one of two different types. Type B is a standard continuous conveyor, that is, it carries the material either way from the center of the track. Type B is continuous across the track. It is reversible so that material may be discharged in either direction. There is also an extension conveyor for use with Type B. Using the extension, the material may be deposited at a point 12 ft from the center line of the track. The two brooms in use on the Missouri Pacific are both equipped with extension conveyors.

Each machine is powered by a 45-hp water-cooled gasoline engine. A dual hydraulic pump furnishes fluid to a cylinder for raising and lowering the brush assembly, a hydraulic motor propells the machine and another hydraulic motor drives the conveyor. A four-speed transmission gives a range of travel speeds from 1 to 12 mph. The rotary brush has a mechanical drive which can be disengaged by a jaw clutch when not in the work position.

A turntable assembly is furnished for turning the machine around or removing it from the track, which may be done by two men.

This machine is made by the Kershaw Manufacturing Company, Montgomery, Ala.

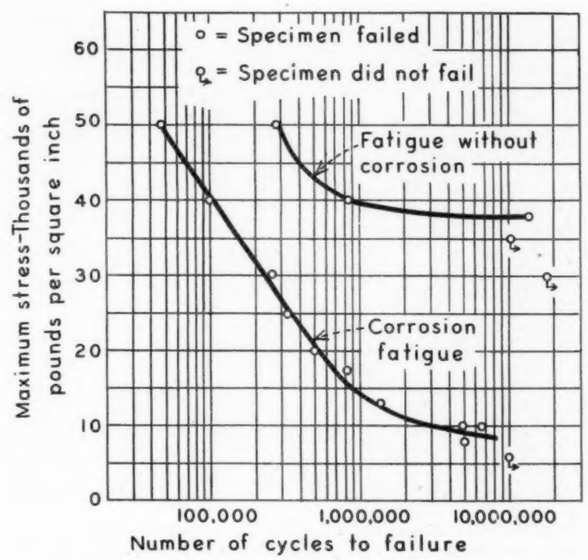


FIG. 1—Comparative "stress number of cycles" curves for fatigue with corrosion and fatigue without corrosion bear out author's contention that corrosion is an important factor in rail-web failures. Results for establishing curves were obtained from tests on web steel which was subjected to a complete reversal of stress loading which ranged from values of maximum tension to values of maximum compression.

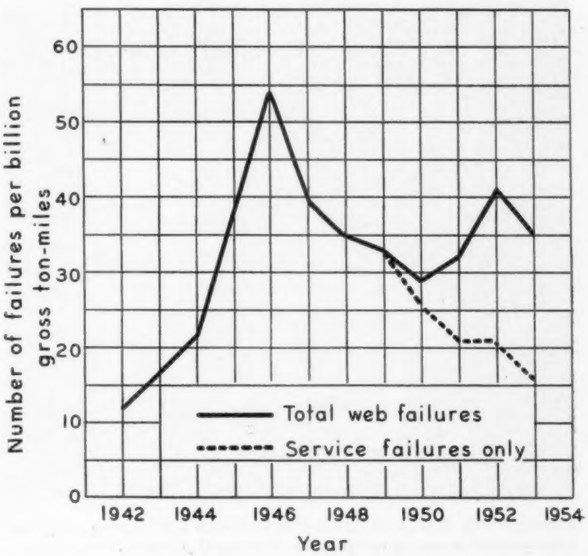


FIG. 2—Chart of web failures (all kinds) on the Pennsylvania shows a steady rise of failures up to 1946, then a marked decline. Reduction, according to author, was due to elimination of controlled bearing joint bar and unfavorable joint lubricants, adoption of new rail sections, plus the advent of the diesel locomotive. Note drop in service failures following use of supersonic inspection devices beginning in 1949.

A Research Man Discusses . . .

Web Failures and Their Prevention

By C. J. Code
Assistant Chief Engineer—Engineer of Tests
Pennsylvania
Philadelphia, Pa.

As engineer of tests for the Pennsylvania for the past 12 years, and as a track supervisor and division engineer prior to that, Mr. Code has a background of both practical field experience and theoretical laboratory study behind his analysis of rail web failures. In this article, which is a condensation of an address given before the Metropolitan Maintenance of Way Club in New York, he discusses the significance of web failures, offers some theories as to their cause and outlines preventive measures.

● I first became interested in investigating rail web failures in 1942. Prior to that time as a track supervisor and division engineer, I had what I think is the usual attitude toward rail failures, i.e., that they were more or less an act of God for which I was not responsible, and that when the cause of a derailment could be assigned as a rail failure, I was relieved of any responsibility. As engineer of tests maintenance of way, I found out that someone had to accept responsibility for rail failures, endeavor to find out what causes them and do something about it.

The statistical report of the Rail Committee, American Railway Engineering Association, shows that out of a total of 30,881 rail failures reported, 13,554, or 44 per cent, were web failures. This report is an accumulative report covering all failures in the 10-year period 1942-51 in rail rolled and laid during that same period. In other words it covers only new rail during its first 10 years of life. The report illustrates the importance of web failures as one of the most frequent types of rail failures with which we are now confronted.

My discussion of web failures here will deal primarily with failures within the joint. Web failures outside the joint have been largely overcome by the changes in rail design which were made in 1946, and I think we can consider web failures outside the joint as more or less of a closed book. The situation is not quite so clear in regard to web failures within the joint and we are still having them in large numbers.

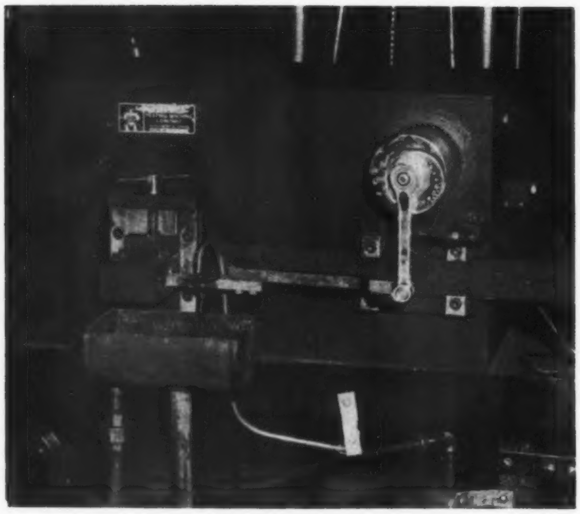
The Author's Contentions

In order that you may more easily follow my discussion of rail web failures as I go from one feature to another of the subject, I have outlined my presentation as follows:

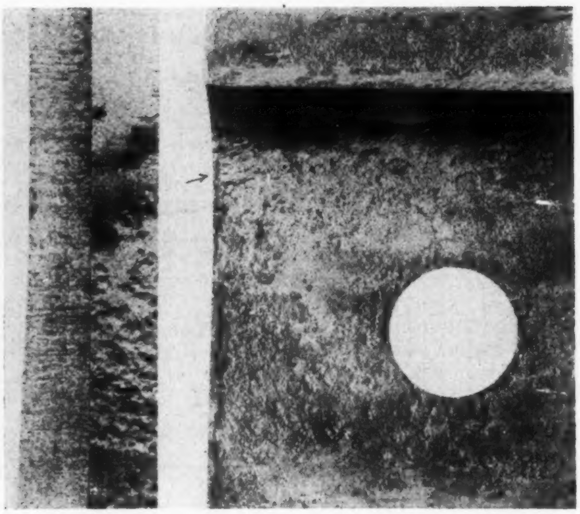
(1) To show you that the web failures are fatigue failures, i.e., they are failures due to a large number of repeated loadings and cannot be explained as simple failures due to a single loading.

(2) To convince you that corrosion is an important factor in connection with these failures.

(3) To show you that corrosion-fatigue is a logical explanation of these failures, i.e., in the majority of cases where web failures occur they can be explained as corrosion-fatigue failures.



LABORATORY set-up showing piece of web steel being subjected to repeated bending and corrosion from tap water.



COMPARISON of corrosion fatigue on laboratory specimen (at left) and on rail (at right) shows close similarity.

(4) To mention that there are other possible causes of some web failures.

(5) To show you what we have done and what we can do about it.

Our study of rail-web failures has included examination of a large number of failed rails which were brought into the laboratory. It included stress measurements using both Stresscoat, a brittle lacquer which, by cracking under load, indicates where the stresses are the highest, and SR-4 electrical resistance strain gages. These devices assist in establishing the locations of maximum stresses and in determining the magnitude of the stress encountered. The studies included a series of fatigue tests run on specimens of rail steel taken from the rail web in order to determine what magnitude of stress and how many cycles of stress were necessary to cause a failure of the web.

This fatigue study, together with examination of examples of failed rails, led up to the conclusion that corrosion must be a factor in these failures (see Fig. 1). Pits and cracks formed in the vicinity of the upper fillet were sharp, deep pits, which are generally associated with corrosion-fatigue. Shallow, saucer-shaped pits are ordinarily associated with corrosion where fatigue is not a factor. The sharp, deep pits act as stress raisers that tend to form cracks at the bottom of the pits.

Field Tests on Rail

Having obtained in the laboratory information as to the location of the maximum stress in the rail joint and some idea of its magnitude, it then became necessary to establish some correlation between the number of cycles of stress causing failures in the laboratory fatigue test and the number of cycles of stress experienced by a rail in actual service. In order to get this information we set up a series of tests in the field in which we measured stresses in the rail in track under a large number of cars and locomotives. Wire resistance strain gages were attached to the rail at the locations of maximum stress, i.e., the upper web fillet at the end of the rail and at a point on the side of the first bolt hole nearest the rail end.

Our strain-gage equipment, including the oscillograph and amplifiers, is mounted in a highway trailer which we can haul over the highway to any location, pull it up on the right of way, attach our strain gages, connect up our wires and start to read stresses. We made these stress measurements at three locations on our railroad—one under heavy, slow traffic in steam territory; another under high-speed, steam and diesel operation; and another under high-speed electric and diesel operation.

You will appreciate that in compiling the figures obtained from these tests it was necessary to make a traffic study to determine how many pieces of equipment of each class passed over the railroad at a given location in a year's time. It was also necessary to tabulate our stress measurements in terms of the number of cycles of stress of each magnitude which could be attributed to the passage of a certain number of units of any class of equipment. It was then necessary to total all these figures, based on the traffic study.

Based on the measurements we made during these field tests and on our previously developed knowledge of corrosion-fatigue obtained in our laboratory, we found that it is entirely possible to develop a failure in a rail joint in a time considerably less than the life of the rail. The fact is that failures were actually developing in these locations in rail which was less than 12 years old.

I don't mean to say that the rate of corrosion which we developed in the laboratory is exactly equivalent to the rate of corrosion which develops in the field. By comparing our figures with figures developed at the University of Illinois, where they have much less corrosive tap water, it became evident that the life of the steel could be changed almost at will by varying the rate of corrosion. The first tests at the University of Illinois, using Urbana tap water, showed very much less decrease in life due to corrosion than our laboratory tests at Altoona, Pa.

Other tests made at the University of Illinois, using 36 per cent sulphuric acid, showed such a sharp reduction in the life of steel that the SN curve (Fig. 1) went straight down instead of leveling off. By the same token, the amount of corrosion in the field varies between wide limits, the most rapid corrosion occurring in tunnels and in the vicinity of water pans. Somewhat less corrosive conditions occur in river valleys, and near industrial plants, and the least rapid corrosion occurs in relatively dry territory where factory fumes are not encountered.

WEB FAILURE in service, which had been undetected prior to removal from track in connection with a rail-renewal job.

About all we can say is that the failures in the field look like corrosion-fatigue failures, that with a reasonable amount of corrosion in the laboratory we can reproduce these failures in laboratory specimens, and that the magnitude of stresses encountered in the field is such that the failures can be explained on the basis of corrosion-fatigue, whereas they cannot be explained on the basis of single cycle loading, or on the basis of fatigue without corrosion.

Causes of High Web Stresses

There are a number of factors which tend to increase web stress in the rail end. One of these is rail-end pinch. When rails are sawed in the mill with a hot saw, the head is slightly depressed so that the fishing surfaces of the rail at the end pinch the joint bar. This causes stress concentration at the end of the rail. Poor fit of joint bars, one bar tight and the other bar loose, or any irregular fit of the joint bars, increases this stress. Loose or worn joint bars cause higher stress in a rail joint, due to the greater impacts which develop under the wheel load. Loose bolts have the same effect. Chipped or battered rail ends add to impact and contribute to higher stress, as does excessive joint gap. The application of new or reformed bars, which changes the locations of the bearings between the bars and the rail, usually results in increased stress. Permitting the rail head to become worn thin increases the web stress. A good heavy rail head acts as a beam and distributes the load well over the rail web, whereas a thin head permits the load from the wheel to be concentrated on a short section of the web. Of course, poor support of the rail ends contributes to high stress.

Stress in a rail end may run from zero to maximum tension, it may be completely reversed, or it may run from low tension to high compression. This depends to a considerable extent on the static stresses introduced by the wedging of the joint bars against the rail under bolt tension. High bolt tension tends to increase the static stress and throw the stress cycle up into the tension part of the diagram where it is more damaging; consequently, we do not favor extremely high bolt tensions, only sufficient bolt tension to hold the joint bars firmly in place.

Various corrective measures have been taken in an effort to overcome these rail-end web failures. The improvements in our rail design, which were aimed principally at web failures outside the joint, have contributed their share toward reducing web failures in the joint. The heavier web, longer upper fillet radius and improved bolt-hole location of the new rail designs have all contributed to reduction in these failures.

The most important factor we know of which can be applied in reducing corrosion-fatigue failures is protection of the rail ends against corrosion. Consequently we now coat all our rail ends, when the rail is laid, with a rust-preventive grease. There is room for improvement in these greases. We would like to have a grease which would stay on the rail and offer proper protection for the life of the joint bars.

The elimination of an earlier type of grease, which tended to accelerate corrosion, has been an important factor in reduction of rail-end failures. On our road we feel that the elimination of controlled bearing bars has also been an important factor. The advent of the diesel locomotive has been another development favorable to reduction in rail-web failures. All our stress measurements have shown that the stresses under diesel locomotives are much lighter than those under heavy steam locomotives.

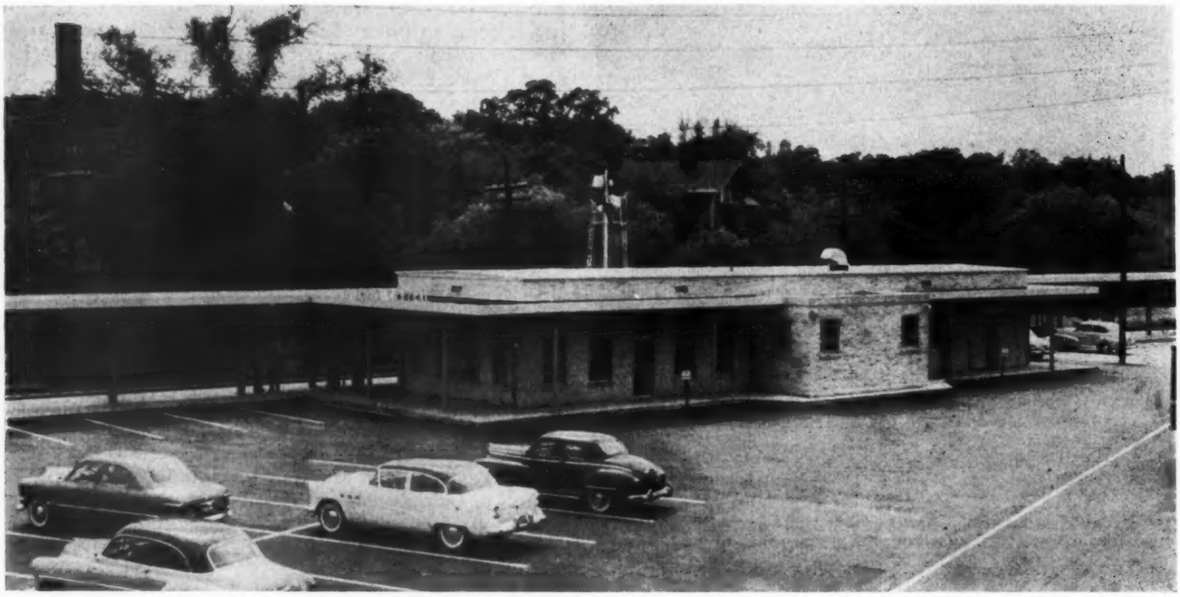
The detection of rail-web failures is almost as important as finding out their cause. On the Pennsylvania we have used the Audigage. The other supersonic devices are fully as effective in locating rail web failures in the joint. In 1949, which was the first year we used supersonic inspection of rail ends, we tested 11 miles of track, detected and removed from track 20 rails containing web failures, and had 5,116 service failures. In 1953 we tested 2,396 miles of track; found and removed from track 2,986 defective rails and had 2,532 service failures. In other words, by use of the supersonic inspection devices we reduced our service failures from 5,116 in 1949 to 2,532 in 1953 (see Fig. 2).

Rail Inspection Important

Some people doubt the value of this type of rail inspection and feel that it shows up too many rails with minor defects which should be left in the track. However, when I see some of the rails which are taken out due to supersonic inspection, I am sure any maintenance-of-way man will sleep better at night if he knows he has and is using an inspection device which can detect these things and have them removed before they cause trouble.

We have not found all the answers. Some rail-web failures at the joint cannot be explained by the corrosion-fatigue theory. Some failures apparently occur due to the sharp edges left by the saw cut at the rail end and others to sharp edges left in the bolt holes. Further research is being done right now at the laboratory of the AAR in Chicago on the effects of bolt-hole finish. Some means of improving this finish have been developed. However, aside from improvements in bolt-hole and rail-end finish, the principal factor which needs to be studied in the future is better protection against corrosion.

Most of the figures I have used in this article are my own. However, I have borrowed freely from the information developed in research work sponsored by the Rail Committee of the AREA. I am deeply indebted to G. M. Magee, director of engineering research for the AAR, and his staff, and to the research staff at the University of Illinois Talbot laboratory, particularly Professors Cramer and Jensen, and Professor Moore, now retired, for the help and information they have given me.



MODERNISTIC styling with low flat lines is feature of rebuilt station building and continuous platform canopy. Parking lot surrounding station on three sides has been enlarged, resurfaced and marked off.

This New Passenger Station . . .

OLD STATION facility was typical of bygone days.

- Incorporates parts of old structure
- Is served by extensive canopies
- Has enlarged auto parking area

Facilities for Passengers . . .

USE OF MODERN concepts of design and decoration are reflected in waiting room which combines the use of terrazzo, art marble, plaster and acoustical tile.

BAGGAGE check window is located in check room adjacent to ticket lobby.

• The Illinois Central recently completed a modernization project involving its passenger station at Rockford, Ill., which, in addition to improving greatly the appearance of the railroad property at that location, has several features designed to enhance the comfort and convenience of the road's patrons. Among these is an extensive canopy system surrounding the station and extending along the adjacent platforms. Another is an enlarged automobile parking area, adjacent to the station, which has been resurfaced and marked off.

The new building is located on the site of the old station, and features low, flat lines in its design. The canopy system is one continuous unit extending around the station on all sides and along the loading platform adjacent to the main tracks for a total distance of about 458 ft. The canopy is designed with modernistic lines in keeping with the architecture of the station itself. The new station, although similar in general layout to the old facility, is a far cry appearancewise from the older structure, as can be seen from a glance at the contrasting photographs appearing on these pages.

Canopy vs. "Modern" Design

The practice of providing canopy protection around station buildings and platform areas is not, of course, new to the railroads, but, on the contrary, was a standard feature of construction years ago. In recent years, however, there has been a trend towards elimination of these canopy systems. Doubtless this trend has been dictated to some extent by considerations of economy. In addition, it was considered in some quarters that the elimination of canopies and overhanging roofs was in accordance with "modern" concepts of architectural design.

Not all railroads have subscribed to this theory, among them the IC. On this road it is held that modern appearance and adequate canopy protection for passengers are not necessarily incompatible with each other. Only a glance at the new Rockford station is needed to confirm the validity of this position. At this station, is is possible for a person to get out of an automobile on the street side of the building, walk around the station and board his train without at any time being without overhead protection. At the same time there can be no question regarding the modern appearance of the completed installation.

Use Parts of Old Structure

In building the new station the existing structure was entirely demolished except for its foundations and portions of the masonry walls. Wood canopies adjacent to the old station and on the platform adjacent to the main track were also removed. After the dismantling work had been completed, the remaining stone masonry foundation was repaired and capped with concrete to provide a foundation for the new structure.

The portions of the old brick masonry walls which were retained were repaired, altered in some instances, and integrated into the common-brick walls of the new structure. These walls were then finished on the exterior with buff range Roman-size face brick. The trim is Indiana limestone and the wall base is cast-in-place concrete.

A combination structural-steel and precast Flexicore concrete-slab construction features the new floor. The roof is of an almost flat design with a very slight pitch from the center crown to the track-side and street-side walls. Open-web steel joists and beveled wood rafters form the roof-supporting structure, which is covered with wood sheathing and a 4-ply composition roofing. Galvanized sheet iron was used for edging around the roof and for the downspouts.

Window openings have been handled in three different ways throughout the building. Some are fitted with aluminum projected-type sash, which provide light, view and ventilation. Picture windows with aluminum trim and sash have been installed at other locations to provide light and view, but no ventilation. At still other openings the space is filled with glass block in aluminum frames. Aluminum has also been used for all exterior swing doors serving the waiting room, while wood doors were used for the other outside entrances. Truck entrances to the baggage room, are fitted with wood overhead doors.

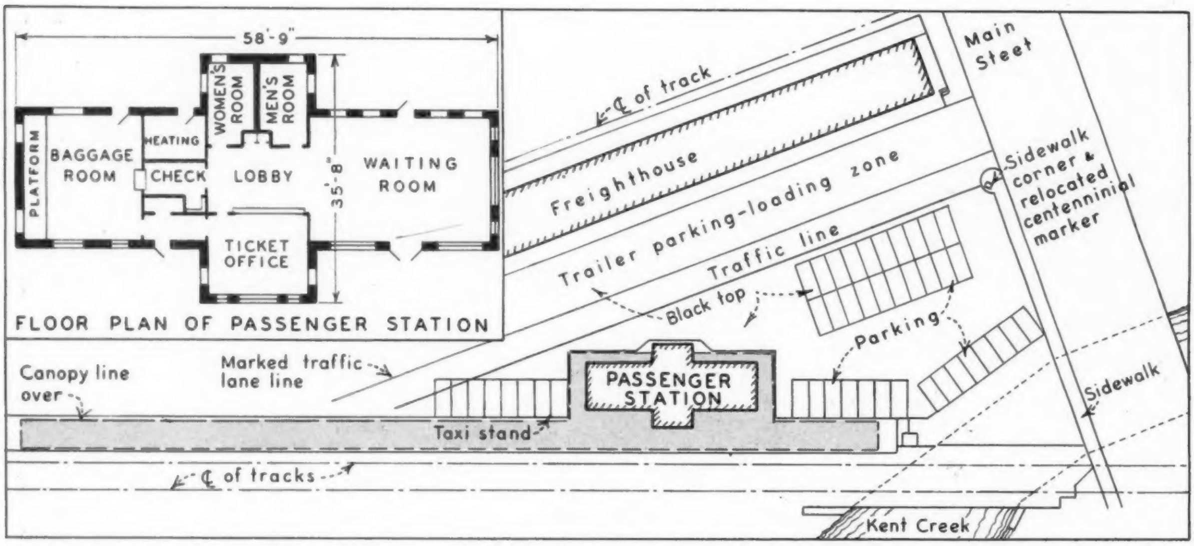
Modernistic Interior

The interior of the new building reflects the use of modern concepts of decoration and design. The floors in the waiting room, ticket lobby and baggage check room, as well

For Employees . . .

REMOTE-CONTROL of IC-C&NW interlocking is provided at operator's desk.

TICKET OFFICE features same general décor as waiting room and has been equipped with new counter, storage compartments and metal furniture.



STATION BUILDING is surrounded by continuous canopy system which extends along the platform in each direction from ends of building for a total distance of about 458 feet. Inset shows floor plan of new station.

as in the toilet rooms, are finished in terrazzo. In the office the floors are covered with asphalt tile, while those in the baggage room and heating and ventilating room are plain concrete treated with a metallic hardener.

Walls throughout the building, except in the baggage room, are plastered. A suspended metal and plaster ceiling, insulated with rock wool, has been used in all rooms, and in the waiting room and ticket lobby an acoustical ceiling has been applied over the plaster. Fluorescent lighting fixtures have been installed in the waiting room, ticket lobby, baggage check room and office. Standard incandescent fixtures have been used in the remainder of the rooms.

Art marble was selected for use as a wainscoting. In the waiting room and ticket lobby the wainscot is 3 ft 6 in high, and in the toilet rooms, 7 ft 5 in. The baggage check room has a 4-in art-marble wall base. The toilet rooms are equipped with new, modern plumbing fixtures and metal partitions.

Art Marble Ticket Counter

There are three ticket windows across the front of the ticket office, which are separated by aluminum and lourvex-glass partitions. The counter top and front side of the counter are of art marble. The front wall slopes inward from the top of the counter to the floor, so that a patron may stand in close with comfort while transacting his business. Above each window is the word "TICKETS" in raised bronze block letters.

The waiting room and ticket lobby have been furnished with Weatherly settees accommodating 30 persons, a train bulletin board, electric clock, drinking fountain and two recessed telephone booths. The baggage check room, adjacent to the ticket counter, is fitted with eight recessed parcel-check lockers and a baggage check window.

The interior of the ticket office has also been furnished with modern equipment including a new ticket sales counter and storage compartments, metal furniture and a lavatory and mirror for the employees. Also included in the office is the usual communication equipment and a remote-controlled interlocking board which governs train movements over the IC-C&NW crossing at Rockford.

In the station baggage room is a raised truck-loading platform with storage space below. A floor-type scale, with working parts housed in a concrete pit below the floor level, is located in one corner of the room.

Heating for the building is provided by a recirculating, forced, warm-air system. Hot-air ducts with circular-type outlets are located in the ceilings. Air for the system is heated by hot water which is supplied through underground lines from the heating plant in the freight station located nearby.

Canopy Construction

The portion of the canopy along the street side and the ends of the building is sloped inward towards the building and is partially supported at intervals along its center line by 6-in round steel columns. The canopy extending each way from the ends of the station along the loading platform is of the butterfly type and is supported by a row of 8-in steel H-columns. The roof construction of the canopy system is of exposed structural steel with a ribbed metal deck covered with 4-ply composition roofing. Incandescent outdoor-type lighting fixtures have been installed at intervals under the canopy.

Other new work around the station grounds, in addition to the enlargement and resurfacing of the automobile parking area with asphalt, included construction of a new sidewalk on the street side connecting Main street with the station platform. New outdoor electric lighting standards have also been installed around a flanking driveway and on the open portions of the loading platforms around the station.

New signs have been erected around the exterior of the building. On the edge of the canopy on the Main Street side, a free-standing aluminum letter sign, reading "ILLINOIS CENTRAL," has been provided, and enameled metal station signs are suspended from the roof of the canopy at three locations on the station platform.

The design and construction of this project was under the general direction of C. H. Mottier, vice-president and chief engineer, and B. M. Murdoch, engineer of buildings. G. A. Johnson & Son, Chicago, had the general contract for the work.

PASSENGER STATION of new, modern design, constructed by the Chicago, Burlington & Quincy at Hannibal, Mo., features a ceiling that glows. This unusual ceiling constructed over the waiting room, lobby and ticket space consists essentially of translucent plastic panels which transmit light from fluorescent fixtures placed in a plenum chamber overhead. When illuminated, the ceiling sheds a completely shadowless, warm, opalescent glow throughout the entire area, thereby enhancing the already restful and comfortable atmosphere of the informal, club-like motif carried out in its decorations and furnishings.

TRIPLE CULVERT installation (right) on the Western Pacific near San Francisco features 98-in by 69-in by 38-ft Armco Multi-Plate pipe-arch units. The culverts carry flow of Arroyo de Coches and Berryeasa creek under the San Jose branch of the road and were installed in conjunction with the construction of a 500-car yard at that point to serve a new plant of the Ford Motor Company.

News Briefs in Pictures . . .

CONVEYORS of various types are used extensively in a new $2 million terminal that has been built by the Pennsylvania at Philadelphia for the Railway Express Agency. For the efficient handling of both outbound and inbound merchandise the terminal has been equipped with a conveyor system consisting of 632 ft of power-operated roller sections, and 186 ft of gravity roller sections. In addition there are seven sections of portable power-operated belt conveyors, used primarily to unload merchandise from cars, and 46 connecting gravity sections used "finger fashion" for loading traffic into trucks.

WHAT'S THE ANSWER?...

. . . a forum on track, bridge, building and water service problems

Insulating Air-Conditioned Buildings

Under what conditions is it desirable to insulate the walls of a building that is to be air conditioned? Explain.

Insulation Advantageous

By L. H. Laffoley

Engineer of Buildings, Canadian Pacific, Montreal, Que.

We interpret the term air-conditioned to mean that the air circulated is to be cooled or heated as required, due to variations in seasonal temperatures. We have not air conditioned many railway buildings to date. In such buildings as have been so conditioned the walls have been insulated where it is practicable.

When properly designed and applied, insulation will permit the use of a smaller air conditioning system than would be required if the walls were not insulated. Operation of the system should be more economical due to the resistance of insulated walls to changes in outside atmospheric temperatures.

The benefits derived from insulated walls are greater during periods of low temperatures than during periods of high summer temperatures. We have had no experience in areas where only cooling is required.

Economically Justified

By Building Engineer

The insulation of buildings that are air conditioned is economically justified if the interest on the capitalized cost of the insulation in place is less than the resultant saving in the operating cost of the conditioning system installed. This last item will, of course, include the saving in interest on the difference between the capitalized cost of the larger conditioning unit necessary for an uninsulated building and the cost of the smaller unit required if the building were insulated.

There is little argument that can be mustered against insulation in the case of new construction. An entirely different problem, however, arises when an existing building is modernized. In this instance the cost of insulating the structure is much greater than is the similar cost in the case of new construction.

The fundamental purpose of thermal insulation is to control and reduce the rate at which heat will flow into or out of the insulated space. When applied to buildings, insulation reduces the amount of heat which enters the building from the outside in the summer and conserves the heat within the building in the winter. Air-conditioning systems are designed to offset these gains or losses in heat and maintain the interior of the structure at the optimum temperature. The unit selected as the best adapted to a particular problem is obviously the one which has sufficient cooling or heating capacity to offset the normal gains or losses of heat while operating at its design capacity but with a sufficient reserve potential to take care of short-time overloads which may develop.

The U.S. Bureau of Standards has determined the value of the factors of thermal conductivity and conductance for various building materials, insulating agents and types of construction. These data are contained in a series of comprehensive tables and charts which are contained in the Heating, Ventilating and Air Conditioning Guide published by the Society of Heating and Ventilating Engineers. With the aid of these coefficients the value of the thermal transmittance of any type of construction may be readily computed and the heat gain or loss determined for the structure for any assumed difference between the interior and exterior temperature and any degree of exposure.

Parallel computations for both insulated and uninsulated construction should be developed to determine the difference in heat losses or gains in the proposed types of structures. With such data complete, the relative economic value can be simply determined.

Answers to the following questions are solicited from readers. They should be addressed to the What's the Answer editor, Railway Track and Structures, 79 W. Monroe St., Chicago 3, and reach him at least five (5) weeks in advance of the publication date (the first of the month) of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you may wish to have discussed.

To be Answered In The February Issue

1. What are the most effective methods of getting the desired distribution of ballast when unloading it from commercial hopper-type cars? Explain.

2. When concrete is used for the walls of office buildings, what is the best finish for the interior surfaces? Explain.

3. To what extent, if any, do rail corrugations influence the life of rail and its renewal cycle in main track? Has the introduction of diesel locomotives increased or decreased the incidence of corrugated rail? Explain.

4. What factors should be taken into consideration in deciding whether ballast-deck or open-deck construction should be used on railway trestles? Explain.

5. What policy should be followed in the testing of control-cooled rail with detector cars? Explain.

6. What points in the water-delivery lines at a diesel service station provide the greatest friction losses? What may be done to eliminate or reduce these restrictions, thereby shortening the time required to service diesel locomotives? Explain.

Corrosion-Inhibiting Chemicals*

When should corrosion-inhibiting chemicals be added to the water used in diesel engine-cooling systems? Why?

Advocates Storage

By H. L. McMullin

Engineer of Tests & Water Supply, Texas & Pacific, Dallas, Tex.

The time of adding corrosion-inhibiting chemicals to the water used in diesel-engine cooling systems is not in itself of very great importance. The important thing is to get it added and to see that the chemical content is maintained at a level suitable to protect the metal from corrosion. This will require that no water be added to a cooling system without adding a corresponding amount of the corrosion-inhibiting chemical.

Chemicals in solution may be added directly to the diesel cooling system. Some of the more soluble dry chemicals may also be added directly to the cooilng system. The less-soluble dry chemicals should be dissolved before being added, and it is sometimes advantageous to dissolve the more soluble dry chemicals before adding them to the cooling system.

At central points where many diesel units are serviced, it is advantageous to treat the cooling water automatically in advance and to store the treated and ready-to-use cooling water in elevated storage tanks from which it may be dispensed directly by gravity to the diesel engine cooling system either as "make-up" or a complete filling. Ground-level tanks may be used as storage for pretreated cooling water, but in such cases it is necessary to use pumps to transfer it from storage to the engine-cooling system.

Another advantage of pretreatment and storage of diesel cooling water lies in the fact that this method reduces the number of possible contacts of the chemical with individuals who repair and service diesels, thereby reducing the chances of dermatitis among those who may be sensitive to the particular corrosion-inhibiting chemical in use.

In general at points where many diesel units are handled, it will be found advantageous to automatically treat and store the treated water in either elevated or ground-level storage tanks ready for use. It can then be distributed through piping systems to whatever diesel-cooling system may require water. It will probably be more economical at other locations to add the corrosion-inhibiting chemical directly to the cooling system, either in solution or as dry powder or pellets, depending upon the solubility of the chemical in current use.

Constant Check Necessary

By R. A. Bardwell

Engineer of Tests, Chicago & Eastern Illinois, Danville, Ill.

The best method of adding treatment for corrosion inhibition would be by mechanically proportioning these chemicals into all water as used in filling the cooling systems on diesels. Costwise the initial installation at a large number of facilities is not feasible on most roads, and reliable personnel must be developed to handle the addition of the necessary chemicals manually. The simplest control of corrosion, in diesel cooling systems, is based on the manual addition of corrosion-inhibiting chemicals directly into the system in accordance with a concentration check made by conductivity meters. This concentration check is made by mechanical personnel at the time the diesel unit passes through the maintenance facility. A schedule chart based on the water capacity of units and concentration of the sample will indicate the amount of chemical inhibitor it will be necessary to add.

When using chromate-type chemicals, the solid pellets or powder can be added directly to the inlet pipe of these systems due to their great solubility. With the borate-type chemical mixtures, some difficulty is encountered in "solubilizing" to high concentration and this type of chemical cannot be added in solid form because of the danger of plugging the cooling systems. Some roads dissolve the necessary dose—in several lots for a full charge—in spouted buckets agitated by a steam hose. Some water should be in the bucket before the chemical is added. Other roads find it easier to mix the borate chemical into a uniform slurry and draw off partially solubilized amounts as required for additions.

Although chemical treatment should be added whenever the amount of chemical present is insufficient, a follow-up of those units which are using excess water, due to leakage, can either point the need for correction of the loss or the necessity for addition of chemical at all terminals. This is necessary as the water leaks from heads cannot be determined except when the unit is under full load and some time may elapse before supervisory personnel can arrange for a rider to check the engine for leaks while en route. It is necessary to add enough treatment to assure an excess of the corrosion-inhibiting chemicals at all times in case raw water is added en route. A 16-cylinder engine in freight service may lose a large amount of its water in only several hundred miles through leaking head gaskets. Since it has been found that even 1000 miles on a unit without corrosion inhibition will cause the start of corrosion and incrustation, this positive method of manual checking and addition will eliminate any chance of the unit leaving the terminal without treatment.

All waters require the addition of corrosion-inhibiting chemicals in doses of from 0.5 to 1.5 oz per gal depending upon the chemicals used and the make of the diesel unit. Waters with a high chloride content require a slightly higher concentration.

Although it would be easier to store treated water for addition to cooling systems, any waste or leak in this stored water would add greatly to its cost due to the high cost of treatment. A rough comparison indicates that, whereas treatment of boiler or generator water might average 5 to 10 cents per thousand gallons, corrosion-inhibited cooling water in the same amount would cost \$5 to \$15 per thousand gallons. This is mainly due to the fact that 30 to 90 lb of chemical per thousand gallons is required for cooling water against only the 1 to 2 lb necessary for boiler water, along with a higher price for chemicals. Precautionary measures would also have to be taken to insure that the stored treated water would be used only for cooling systems. For these reasons the corrosion-inhibiting chemicals are added to water used in diesel-engine cooling systems on our road manually as outlined.

*Other answers to this question were published in September, page 74. Because of space limitations, the answers by Mr. Bardwell and Mr. McMullin were omitted from the September issue.

Use of Wood and Fiber Rail Shims

The AREA specifications for laying rail provide: "Standard metal, fiber or wood shims shall be placed between the ends of adjacent rails to insure proper space for expansion. . . Where shims are used they shall be removed to within 12 rails of the laying." What, if any, advantage results from the removal of fiber or wood shims as specified? Explain.

Creates Arguments

By Frank Over, Jr.

Engineering Division, Military Construction, Department of the Army, Washington, D. C.

Although government specifications permit the use of metal as well as fiber and wood shims, it is a very rare occasion that anything except wood shims are used. The usual procedure in laying new rail is to use a strip of soft wood approximately an inch in width and of the prescribed thickness and to hold this between the rail ends until the rails are secured by the joint bars. The small inserted piece is then broken off and the action repeated at the next joint. Generally, these wood shims drop between the ties after the first fall in temperature. Even if they remain, however, they disappear in a short time.

If the rails are properly laid and secured, removal of wooden shims is not necessary and the specification requiring their removal only creates argument between the contractor and the inspector. A large eastern railroad, noted for its rigid standards, specifies that wood shims may remain in track.

Wood or Fiber Shims Best

By A. B. Chaney

Assistant Chief Engineer System—Maintenance, Missouri Pacific, St. Louis, Mo.

When fiber or wood shims are used there is no advantage in removing them. After serving the purpose for which they are intended they will become slightly compressed and later drop out from the vibration of passing trains. Leaving shims in place has the advantage of retaining the required gap for a longer period or until anchors are set, joints tightened and full spiking completed. Retention also saves the cost of removal, which in the case of metal shims is more than the cost of fiber or wood shims.

Fiber and wood shims have the further advantage, over some types of metal shims, of not interfering with the movement of on-track machines that follow closely behind the rail-laying operation.

Prefers Metal Shims

By T. L. Kanan

Assistant Engineer of Track, Colorado & Southern, Denver, Colo.

It is my thought that metal shims are the best means of insuring proper expansion between rail ends. It has been the practice on our railroad to use the metal shims from 12 to 15 rails behind the rail actually being laid to insure the equal distribution of expansion. This equalization can be maintained by holding shims to this distance, and expansion will not close up by the slight bumping of the rail as it is being placed in track.

Fiber or wood shims placed at rail ends as rail is being laid do not provide equal expansion as such shims have a tendency to crush when rails are laid in contact with each other. Occasionally these shims do not loosen and drop clear, and enough of this obstruction is left in the joint to prevent proper rail expansion and contraction. Since the metal shim is removed from the joint, the rail end is clear and expansion can move in and out more readily.

Save Manpower

By Track Supervisor

Before any discussion on rail expansion shims is begun, it should be understood that the use of metal shims is ruled out of the debate as their use in shimming rail expansion should not be considered by any wise maintenance man. The initial cost of metal shims and the manpower cost of handling them on a rail-laying job should be sufficient argument for the abandonment of their use. Furthermore, metal shims are often misused and installed in a manner which permits equipment to run over or otherwise damage them. When the rail expands slightly during the increasing warmth of a particular day, or is bumped tight against the shims, it often becomes quite difficult to remove them. This results in wasted manpower and damage to shims.

If rail expansion shims are improperly placed, there is often no advantage in using them. It is frequently the practice to place the shim at the rail head. When so placed, the impact from the rail being installed often crushes the shim severely. The preferred location by far for shim insertion is at the fillet at the junction of the web and rail base. It is safer for the man handling the rail being installed to hold the shim at this location with one hand, while he holds the head of the rail being placed with the other. When installed at this location, no unusual pressure is applied to the shim, but at the same time it can separate the rail ends the intended distance. Further, the shim so placed is not in the way of the rail-laying equipment or the installation of the splice. From its position in the fillet, between the web and the rail base, the shim can easily fall out when it has fulfilled its intended purpose.

With labor costs what they are today, every effort must be made to conserve manpower. Should only 300 rails be laid in a day's work, and assuming that a man could walk and work fast enough to remove two shims a minute, over 2 hr of the time of one man would be required to remove the shims.

Under any circumstances, shims should remain in place until not less than a dozen joints are fully bolted. The reason for this is to prevent loss of expansion which might be caused by bumping of the rail or the pressure exerted by other forces. Unless they stick to the rail the shims will generally drop out of place (except where the joint is directly over a tie plate) with the normal contraction which occurs during the night following the rail-laying operation. Furthermore, any slight deviation from the original temperature at the time of rail laying will usually not be exceeded for a few months after the rail is laid, and undesirable stresses will not be set up in the rail. This fact permits the retention of the shim in place without harm.

Let us assume that the shim remains in place between the rail ends and cannot get out. With a coefficient of expansion of 0.0000065, a 39-ft rail will expand

about 5/16 in with a 100 deg temperature rise. If the rail were not permitted to expand, this temperature change would produce a pressure of about 20,000 psi. This is at least ten times greater than the maximum stress at which ordinary southern yellow pine or almost any other inexpensive wood will fail in compression. Therefore, a wooden shim would fail or be severely compressed in trying to prevent the normal expansion of a rail.

Fiber shims will not compress as readily as the wood ones. They cost more and, being a specialty item, they are not as desirable as wood shims.

Considering the facts that most wood shims will

(1) Drop out because of normal temperature changes,

(2) Be compressed to very small dimensions which will not interfere with expansion allowances,

(3) Rot out after a period of time, should they remain in place, it can be concluded that no advantage is to be gained from the practice of removing wood rail expansion shims and that these inexpensive and easily produced shims are the best adaptable for use.

Heating Diesel Fuel Oil

Under what conditions, if any, is it desirable to heat diesel fuel oil in cold weather to reduce pumping difficulties? What methods may be used? Explain.

Fuel Oil Should Be Heated

By W. F. Arksey

Engineer Water Service and Fuel Facilities, Great Northern, St. Paul, Minn.

We are strongly convinced that diesel fuel oil should be heated for best results. Our temperatures fall as low as — 40 deg and — 50 deg F at times, and we are then sure to have trouble. The cloud point on oil used in winter months averages about 0 deg F. It is high cloud point rather than pour point that causes trouble. Wax in the oil separating out brings the condition known as cloud point. This wax builds up on strainers and filters to the extent that they become completely clogged.

At the present time we have only a few plants where oil is heated. However, the future trend will be in the direction of heating all fuel-oil facilities on the colder parts of our lines. The expense of running long steam lines or building separate heating plants has caused us to search for other solutions to the problem. At one wayside station where only a few diesels are fueled each day we are trying heating the filter only. This is done with an electric oil-circulation heater connected around the filter. The idea is to melt any wax that collects on the filter so it can be flushed through when the next diesel is fueled. Last winter was not a good test for this installation as weather was too mild, so the test is continuing. At other points we have just heated the pumphouses.

One 5000-bbl tank is equipped with a steam-type drum heater which heats oil as it is withdrawn from the tank. This eliminates the need for heating the entire contents of the tank. The temperature is controlled thermostatically by drawing oil from the center of the tank through the heater. It is also possible to use the outer layer of oil as an insulating blanket.

In locations where we do not have extremely low temperatures we do quite well by drawing the oil from the center of large tanks. The oil at that point seldom reaches a temperature less than 10 deg F. To the best of my knowledge we have not had trouble pumping cold oil where there were neither filters or strainers in the line.

Diesel Power and Spring Frogs

What, if any, effect does the operation of diesel power have on the location and use of spring frogs? Explain.

Used for Maximum Safety

By L. F. Racine

Chief Engineer, Chicago, Indianapolis & Louisville, Lafayette, Ind.

The operation of diesel power through spring-rail frogs in main track has no apparent effect on them regardless of location. The spring-rail frog, properly designed, is extensively used where maximum safety is required.

The spring-rail frog has recently received more attention than for some time, principally for the reason that many of the objectionable features of the older designs have been corrected. The type of spring-rail frog that is now available is more rugged and more easily maintained. On some fully-dieselized railroads, spring-rail frogs are used almost exclusively in main-line turnouts and crossovers where traffic is predominantly on the main track. Shock absorbers may be secured to hold the spring rail open during the passage of a train and thereby eliminate many impacts on the frog structure.

Most of the main-line frogs on the Chicago, Indianapolis & Louisville are of the spring-rail type. We have experienced no difficulty with them and have been operating diesel power exclusively since early 1948.

From my observation, I am convinced that the use of diesel power produces no unusual effect on spring-rail frogs.

Diesels Present No Problem

By R. W. Putnam

Engineer Maintenance of Way and Structures, Southern Pacific San Francisco

We have not found any reason for changing our present plans for the use of spring frogs as we have experienced no trouble of a nature which would indicate that diesel power has any effect different from those effects imposed by the operation of steam power.

There is only one condition which has developed in connection with frogs that has caused any concern and this does not apply to spring-rail frogs any more than it does to a rail-bound or rigid frog. The trouble I refer to has been the rather frequent derailment of empty cars at the throat of frogs of facing turnouts on heavy descending grades on movements entering the turnouts. These derailments, without question, have been

caused by dynamic braking of the train by diesel power. In these cases the weight of the train, applied against empty cars toward the headend, holds the empty cars in suspended position, thus taking the weight off the trucks and permitting the faces of the wheels to climb the guard rail. We have had no derailments of diesel engines themselves in these instances. The derailments have been confined to empties or light loads. This, of course, is an operating matter and is being corrected currently.

Joint Bar Maintenance

To what extent does the speed of trains contribute to the amount of joint-bar maintenance required? Explain.

Good Maintenance Saves Rail

By H. S. Chandler

General Supervisor of Track, Chesapeake & Ohio, Richmond, Va.

I think that the best possible maintenance should be applied to any joint, regardless of speed. However, preference should be given to joints in high-speed territory. All joints should be kept to proper surface at all times, bolts should be properly maintained and joint bars should be oiled inside and out about once a year. While bolts should be kept tight at all times, inspection should be made to see that the joint bars do not freeze on the rail, as bolts can be too tight as well as too loose. This is as important on heavy tonnage territory as it is on light traffic high-speed territory. In fact, the best possible joint maintenance should be applied everywhere, even on team tracks.

Well-maintained joints will save rail, the joint itself, crossties and prevent pumping of tracks. This will mean a great saving in material and labor and in the maintenance of the equipment that operates over the tracks. Proper maintenance of joint bars should make them last the life of the rail, regardless of the speed of operation. It will greatly increase the life of the rail and the joint bars as well as that of the equipment.

Speed Has Little Effect

By P. A. Cosgrove

Division Engineer, Illinois Central, Champaign, Ill.

In my opinion the speed of trains contributes very little, if any, to the amount of joint maintenance required. It is the amount of tonnage over the joint bars that causes the maintenance that is needed.

As a comparison, we recently relieved some rail and angle bars that had been in track for 20 years. On another portion of this same line, where the speeds of our fast passenger trains, as well as those of freight trains, are the same as those above, we relieved rail and angle bars which were less than ten years old. The tonnage on the last stretch of track is approximately twice as great as that of the first stretch.

The angle bars were worn considerably more and the joint maintenance required was much greater on the heavy tonnage track than it was on the track with tonnage only half as great, although the speed of the trains was the same at both locations.

Maintenance Related to Speed

By Herbert J. Crannan, Jr.

Assistant Supervisor-Track, New York City Transit Authority, Brooklyn, N. Y.

There is positive correlation between the amount of joint-bar maintenance required on any particular stretch of track and the speed of trains passing over that track. Train speed is not, of course, the only factor involved, but it is an important one. There are many ways, direct and indirect, in which train speed will influence and cause additional joint-bar maintenance.

A natural sequence of higher train speeds would call for intensified inspection. Details of line and surface at the joints becomes vital on high-speed track and must be constantly checked and adjusted. The consequences of sudden rail failure is magnified on a high-speed road. Therefore, where the presence of incipient cracks in rail ends within the joint area is even remotely suspected, the bars will have to be removed at once to permit closer observation.

Fast trains will cause additional vibration and greater shock of impact at rail joints. Excessive bolt loosening will result from the former and the latter will aggravate the problem of bolt and joint-bar breakage. Bent and worn joint bars, incapable of holding good line and surface, demand quick removal and replacement. Even where it is the practice to recondition such bars it might be advisable to install new bars and use the salvaged ones on less important lines.

Perhaps the greatest increase in the usual mount or joint-bar maintenance will be felt in conjunction with the use of insulated joints. If signal failures are to be avoided, additional maintenance will be required to offset the premature wear and crushing of insulation fiber which will no doubt result from greater train speeds.

Supersonic Testing of Masonry

To what extent are supersonic devices adaptable for determining the soundness of mass masonry structures such as bridge piers and abutments? Can they be used in place of core borings? Explain.

A Valuable Aid

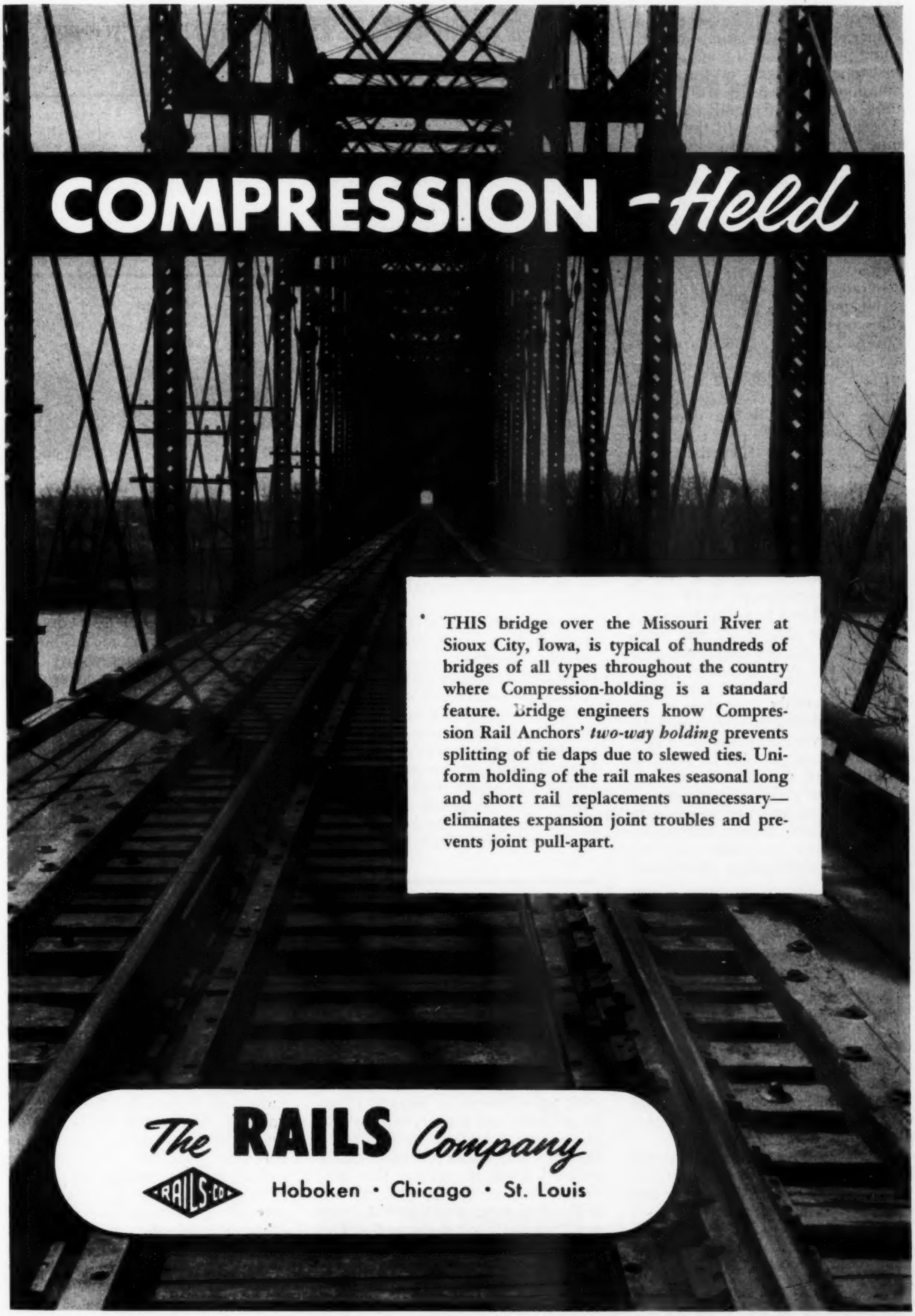
By W. G. Burres

Railway Representative, Structural & Railway Bureau, Portland Cement Association, Chicago.

To answer the question properly it is necessary to explain the nature of the apparatus used by our organization in the testing of concrete structures. The device, called the "Soniscope" was developed by engineers of the Hydro-Electric Power Commission of the province of Ontario in Canada. Through arrangements with this commission, the Soniscope is being constructed exclusively by the McPhar Engineering Company, Toronto, Ont., whose representative in the United States is the G. D. Smith Company, Los Angeles, Cal.

The Soniscope was developed as the result of a desire to test con-

(*Continued on page* 62)


COMPRESSION -Held
THIS bridge over the Missouri River at Sioux City, Iowa, is typical of hundreds of bridges of all types throughout the country where Compression-holding is a standard feature. Bridge engineers know Compression Rail Anchors' *two-way holding* prevents splitting of tie daps due to slewed ties. Uniform holding of the rail makes seasonal long and short rail replacements unnecessary—eliminates expansion joint troubles and prevents joint pull-apart.
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crete without destroying it. The apparatus actually measures the velocity of transmission of ultrasonic pulses through concrete. The instrument consists of three main components—basically a control unit, a transmitter and a receiver. A generator housed in the control unit provides the pulse which is impressed upon the concrete by a transmitter through a rubber diaphragm enclosing a block of piezoelectric crystals. The receiver also consists of crystals connected to a battery-operated pre-amplifier. A compressional wave induced by the generated pulse is picked up by the receiver and transmitted to an oscilloscope screen.

A calibrated time scale on the screen provides the means of measuring time of travel of the pulse through the concrete. Some 100 pulses per second are generated and transmitted.

An advantage of the pulse method of testing is that it does not depend on size or shape of the specimen or structure and applies equally well to a dam or a concrete pavement slab. Thus concrete can be field tested without obtaining samples from the structure. During its early development there was a natural tendency to credit the pulse velocity test, made by the Soniscope, as being of significance considerably beyond its actual potentialities. Some thought that pulse velocity should be a measure of the elastic modulus of the concrete, while others went so far as to suggest that it might also be used as a measure of strength. As of now, it is felt that pulse velocity should be considered only as a property of the concrete being tested, related to other properties only by empirical relationships established by test.

The Portland Cement Association has used the Soniscope in testing many structures including bridges, dams, and specimens of the "Long-Time Study of Cement Performance in Concrete." In these tests no attempt has been made to convert the group velocities obtained to the dynamic modulus of elasticity. As a measure of the quality of the concrete, experience has indicated that for purposes of very general classification the following categories may be used:

Velocity above 15,000 ft per sec —concrete excellent.

Velocity 12,000-15,000 ft per sec —concrete good.

Velocity 10,000-12,000 ft per sec —concrete questionable.

Velocity below 10,000 ft per sec —concrete poor.

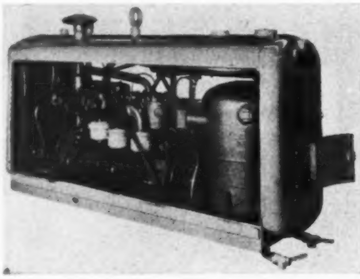
Of course, these values are by no means absolute and exceptions possibly may be noted in all classes. The greatest value, it is felt, can be obtained by using the Soniscope to make repeated tests on the same structures and detect changes in the condition of the concrete through changes in velocity.

The Soniscope may be and has been successfully used on structures ranging in thickness from 2 in. to 50 ft. Both the transmitter and receiver are installed in the same fashion. The rubber diaphragm is pressed securely against the concrete surface previously wetted with oil or water to aid in obtaining good transmission of the pulse. The elapsed time measured is that time required for the pulse to pass from tranmsitter to receiver, thus indicating the quality of the concrete in the area between transmitter and receiver.

When investigating scour at bridge piers or abutments the area to be tested lies below the water surface and is thus inaccessible. Should the pier be de-watered it would be possible to make tentative determinations on the quality of the concrete at areas of scour. As indicated previously the greatest value of the instrument lies in repeated tests to detect changes in concrete condition. This testing technique has recognized limitations as it measures but one property of concrete. However, if all other available data are considered and used in conjunction with the Soniscope it can be a valuable assistant in determining the condition of concrete structures.

PRODUCTS OF MANUFACTURERS . . .

. . . new, improved equipment, materials, devices



UTILITY-TYPE AIR COMPRESSOR

AFTER AN ABSENCE of several years, the LeRoi 105 cfm Utility air compressor has been put back into the Airmaster line manufactured by the LeRoi Company, Milwaukee, Wis. Featuring several improvements, including an oil bath air cleaner and a pressurized cooling system, the unit employs the same basic engine as that used in the LeRoi 105 portable air compressor.

Unlike the standard skid-mounted portable-type compressor which usually requires a lengthwise mounting on a truck bed, the Utility is built up under one housing which includes an upright air receiver, thereby making it possible for the machine to be mounted crosswise. Overall width of the unit is 25 in, and overall length is 82 in. The machine is provided with a lifting eye in the center of the hood top to facilitate moving the unit from one location to another. All of the controls and the instrument panel are located on the end of the machine for easy accessability when mounted crosswise on a truck bed. Water, gasoline, and oil filler necks all protrude from the hood top.

TRACTOR-SHOVEL

A torque-converter-driven tractor-shovel with a struck bucket capacity of 1 cu yd has been announced by the Frank G. Hough Company, Libertyville, Ill. This model, to be known as HRC, is a four-wheel-drive unit equipped with power steering for ease of operation and maneuverability. It is available with either a gas or diesel engine.

One of the reported features of this machine is a full-reversing transmission which will provide four speeds in either direction. It is also stated that the torque-converter drive reduces operator effort and the amount of "clutching" and gear shifting necessary.

THE MONTH'S NEWS
Railway Personnel

Engineering

S. P. Berg, chief engineer of the Duluth, South Shore & Atlantic, has resigned his position with a view of accepting employment in the Southwest.

W. R. Wagner, division engineer on the Chicago & North Western at Antigo, Wis., has transferred his headquarters to Escanaba, Mich., with jurisdiction over the same territory.

J. W. DeMoyer, Jr., division engineer on the Reading at Philadelphia, has been named assistant engineer, maintenance of way, suceeding **A. P. Crosley,** whose promotion to engineer maintenance of way was announced in the October issue.

J. H. Cox, office engineer on the Baltimore & Ohio at Chicago, has retired after 44 years of railroad service.

E. S. Laws, structural engineer on the Seaboard Air Line at Norfolk, Va., has been appointed assistant division engineer at Raleigh, N. C. Mr. Laws is a native of Arran, Fla., and was graduated in civil engineering from the University of Florida in June 1950. For a time he was associated with the Florida highway system in Tallahassee as a bridge designer. He began his career with the Seaboard as structural engineer at Norfolk in 1951.

Kenneth L. Moriarty, vice-president—operating of the Denver & Rio Grande at Denver, Colo., has been appointed chief engineer—system of the New York Central, with headquarters at New York, which is a new position on the Central. It is understood that Mr. Moriarty will have system-wide supervision over engineering matters involving construction or property improvements.

Kenneth L. Moriarty

Mr. Moriarty was born on November 18, 1896, at Joliet, Ill., and began his railroad career in 1918 in the engineering department of the Chicago Great West-

Railway Personnel (Cont'd.)

ern. He entered Rio Grande service as division engineer at Gunnison, Colo., in July 1924. Later he served in that position and as roadmaster and trainmaster at various points until 1939, when he was promoted to superintendent at Grand Junction, Colo., being transferred to Salt Lake City, Utah, in 1943. Mr. Moriarty was appointed assistant chief engineer in February 1946, chief engineer in January 1948, and assistant general manager in 1951. Named general manager in 1952, he served in that capacity for two years before taking charge of the operating department as vice-president.

Charles E. Neal, whose promotion to division engineer on the Northwestern Pacific at San Rafael, Calif., was announced recently (RT&S, September, page 88), was born at Oakland, Ore., July 9, 1909. Mr. Neal began his railroad service with the Southern Pacific on September 7, 1926, in engine service on the Portland division. In 1927 he joined the maintenance-of-way department as a miner and carpenter on the Shasta division, and the following year was made steam shovel engineer and fireman at Salt Lake. From 1931 to 1937 he served in various positions as crane engineer and track equipment operator, and in 1937 he was appointed section foreman on the Shasta division. He was promoted to roadmaster in 1941, serving

Charles E. Neal

on the Shasta and Western divisions until 1946 when he was appointed general track supervisor.

A. B. Hillman, Jr., assistant engineer on the Chicago & Western Indiana and The Belt Railway of Chicago, has been named engineer maintenance of way at Chicago, succeeding **G. G. Amory,** who has retired. Mr. Hillman has been succeeded as assistant engineer by **Ralph G. Michael,** designer in the engineering department.

Walter P. Hendrix, who has been appointed assistant chief engineer on the Pennsylvania at Pittsburgh, Pa. (RT&S, September, p. 88), was born at Pittsburgh, August 17, 1912. He attended Iowa State College where he received a B.S. degree in civil engineering in 1935, and began his railroad service with the Pennsylvania in October 1944. He served as a draftsman in the B&B department

Walter P. Hendrix

at Pittsburgh from 1944 to 1949 at which time he was promoted to design engineer at that same point. He served in that capacity until 1953 when he was named assistant engineer maintenance of way at Chicago.

Thomas S. Carter, Jr., who has been named chief engineer of the Missouri-Kansas-Texas, at St. Louis, Mo. (RT&S,

October, p. 81), was born June 6, 1921, at Dallas, Tex. He began his railroad service with the Katy as a rodman at Dallas in October 1941 and served there until his entrance into the U.S. Army in 1944. Following discharge from military service in 1946, Mr. Carter

Thomas S. Carter, Jr.

returned to the railroad as a transitman at Dallas. Later that same year he was promoted to assistant engineer at St. Louis, remaining there until 1952. At that time he was appointed assistant district engineer at Franklin, Mo., where he served until his promotion to district engineer at Parsons, Kan., in 1953. He became assistant chief engineer at St. Louis later that same year. Mr. Carter is a 1944 graduate of Southern Methodist University.

Henry S. Ashley, whose appointment as assistant to chief engineer of the Boston & Maine at Boston, Mass., was announced recently (RT&S, October, p. 78), was born at Lowell, Mass., on January 7, 1893, and entered railroading

Henry S. Ashley

in the engineering corps of the B&M as a chainman in September 1912. After serving in various capacities in the engineering corps he was promoted to assistant engineer in September 1924, becoming acting assistant division engineer in May 1928. In October 1929 Mr. Ashley was appointed supervisor of track, resuming his duties as acting assistant division engineer the following November, and becoming assistant divi-

Railway Personnel (Cont'd.)

sion engineer in January 1930. In July 1940 he was appointed construction engineer at Baldwinville, Mass., and in November 1941 he was named acting division engineer of the Portland division. Mr. Ashley was promoted to division engineer of the Portland and Terminal divisions in March 1942, to engineer of track at Boston in March 1945, and to assistant engineer maintenance of way in July 1949, the position he held at the time of his recent appointment.

Frank M. Kaylor, whose promotion to assistant division engineer on the Southern at Knoxville, Tenn., was announced recently (RT&S, October, p. 77), was born on June 20, 1924, at Appalachia, Va. He entered the service of the Southern in June 1940 as a section laborer at Bristol, Va. In May 1943 he was furloughed for naval air service and returned to the railway in June 1947. He became a student apprentice at Atlanta, Ga., the following December, advancing to assistant supervisor of track in June 1948. In November 1949 he was appointed bridge and building supervisor at Valdosta, Ga.—the position he held at the time of his recent promotion.

Charles W. Bowers, whose appointment as chief engineer of the Savannah & Atlanta at Savannah, Ga., was announced recently (RT&S, September, p. 88), was born at Andalusia, Ala., on January 12, 1918, and was graduated in civil engineering from Alabama Polytechnic Institute in June 1941. Following summer vacation employment in roadway labor on the Central of Georgia, he entered full-time service in 1941 as an assistant engineer at Savannah. He served in the U. S. Army from 1944 to 1947, when he returned to his former position at Savannah. In 1950 Mr. Bowers was advanced to supervisor of track at Millen, Ga., where he remained until 1952, when he was named assistant chief engineer on the S&A at Savannah, the position he was holding at the time he received his recent promotion.

Walter E. Heimerdinger, assistant chief engineer of the Rock Island, at Chicago, has retired after 44 years of railroad service. As noted elsewhere in these columns, Mr. Heimerdinger is now associated with the Camef Equipment Corporation, Chicago.

Mr. Heimerdinger was born at Vulcan, Mich., February 12, 1889. He attended the University of Michigan, and began his railroad service in 1911 as an assistant in the engineering corps of the Rock Island. He subsequently held positions successively as building inspector, instrumentman, engineer on construction work, and assistant engineer until 1917 when he joined the U. S. Army. Following his discharge from the military service in 1919, he returned to the Rock Island as assistant engineer, later serving as office engineer, resident engineer, roadmaster, division engineer, locating engineer, district maintenance engineer, division superintendent, and acting assistant chief engineer. In 1948 Mr. Heimerdinger was appointed engineer of bridges at Chicago, and he was named assistant chief engineer in 1950.

Walter E. Heimerdinger

Thomas K. Dyer, who has been promoted to division engineer of the Boston & Maine at Boston, was born at Medford, Mass., on January 28, 1922, and was graduated in civil engineering from Massachusetts Institute of Technology in 1943. He entered the service of the

B&M as a structural draftsman at Boston in 1946. With headquarters continuing at Boston, Mr. Dyer was appointed structural designer in 1947, project engineer in 1949, and assistant structural engineer in 1951. In 1953 he

Thomas K. Dyer

was appointed assistant division engineer at Boston, in which capacity he was serving when he was promoted.

Jacob S. Andrews, who has succeeded Mr. Dyer as assistant division engineer at Boston, was born at Gloucester, Mass., on December 31, 1905, and attended the University of Maine and Tufts College (night school). Entering the service of the B&M as a chainman at Boston, Mr. Andrews subsequently served as rodman, draftsman, transitman, cost engineer, assistant bridge and building supervisor, and supervisor of welding. He held the latter position at the time of his recent promotion.

Oscar C. Benson, who has been appointed assistant engineer maintenance of way of the Boston & Maine at Boston, was born on January 19, 1901, at Concord, N. H., where he entered the service of the B&M as a chainman in

Oscar C. Benson

the engineering corps in June 1917. He was advanced to assistant supervisor of track at Lowell, Mass., in 1929, and the following year was further advanced to supervisor of track, in which capacity he served successfully at Concord, Plymouth and Lawrence, Mass., and Woodsville, N. H. In 1942 Mr. Benson

Railway Personnel (Cont'd.)

returned to Concord as assistant division engineer, and on December 1, 1952, was appointed division engineer at Boston, the position he was holding at the time of his recent promotion.

Harry F. Bird, whose promotion to district engineer of structures on the New York Central, Lines East, and Boston & Albany, with headquarters at New York was announced recently (RT&S, October, p. 77), was born on January 21, 1897, at Overton, Pa., and was graduated in civil engineering from Bucknell University in June 1926. Mr. Bird began his railroad career as a chainman on the NYC at Jersey Shore, Pa., in June 1924 and subsequently served as rodman, transitman, and draftsman until April 1, 1934, when he was appointed bridge and building inspector. On January 1, 1942, he was named assistant supervisor of bridges and buildings at Syracuse, and on March 1, 1943, was advanced to supervisor of bridges and buildings at that location—the position he held at the time he received his recent appointment.

Robert K. Seals, whose promotion to division engineer on the Southern at Greensboro, N. C., was announced recently (RT&S, October, p. 77), was born on January 24, 1922, at Morganton, N. C., and attended Lees McRae Junior

Robert K. Seals

College and North Carolina State College (B.C.E., Construction Option). He entered the service of the Southern as a rodman in April 1946, and the following August became a student apprentice at Seneca, S. C. Advancing to assistant supervisor of track at Greenville, S. C., in December 1946, Mr. Seals was appointed supervisor of track in February 1948, and held that position successively at Orangeburg, S. C., Charleston, S. C., and Salisbury, N. C. In 1953 he was made assistant division engineer at Knoxville, Tenn., the capacity in which he was serving at the time of his recent promotion.

Track

M. D. McCord, assistant roadmaster on the Wisconsin division of the Chicago & North Western, has been promoted to roadmaster on the Salena division with headquarters at West Chicago, succeeding **G. A. Fox,** who has been transferred to the Dakota division at Tracy, Minn.

R. E. Gray, general track foreman on the Milwaukee, has been promoted to roadmaster at Rapid City, S. D., succeeding **W. R. Ringlbauer,** who has been transferred to Savannah, Ill. Mr. Ringlbauer replaces **C. H. Schwiekert. C. W. Geelhart,** assistant roadmaster, has been promoted to roadmaster at Cedar Falls, Wash., replacing **G. P. Hall,** retired.

F. R. Matthews, assistant supervisor track on the Pennsylvania at Baltimore, Md., has been appointed supervisor track at Anderson, Ind., succeeding **W. J. Yahn,** who has been transferred to Chambersburg, Pa. Mr. Yahn succeeds **E. M. Edwards,** who has resigned. **M. H. Barber,** general track foreman at Anderson, has been appointed assistant supervisor of track at South Chicago, replacing **J. P. Garrett,** who has been transferred to Orville, Ohio, succeeding **J. F. Youngstrom.**

J. F. Lager, assistant supervisor track on the Illinois Central at Clinton, Ill., has been appointed supervisor of track on the Centralia district with headquar-

ters at Carbondale, Ill., succeeding **H. F. Longhelt,** who was transferred to Bloomington, Ill., earlier this year. **T. F. Kenney,** supervisor track at Carbondale, has been transferred to the Iowa division at Waterloo, Iowa, succeeding **F. L. Stiner,** whose death is noted elsewhere in these columns.

A. F. Richards, assistant roadmaster on the Frisco at Afton, Okla., has been promoted to roadmaster on the Chickashaw sub-division with headquarters at Oklahoma City, succeeding **V. E. Yeargain,** who has been transferred to the Oklahoma sub-division with headquarters as before at Oklahoma City.

H. E. Simmons, assistant supervisor of track on the Maryland division of the Pennsylvania at Wilmington, Del., has been promoted to supervisor of track (special duty), office of comptroller, at Philadelphia, Pa. **A. W. Town,** junior engineer of track on the Fort Wayne division, has been advanced to assistant supervisor of track on the Philadelphia division, at Enola, Pa., to replace **W. T. Addison,** who has succeeded Mr. Simmons at Wilmington.

J. P. Weiland, whose promotion to roadmaster on the Milwaukee at Sioux City, Iowa, was announced recently (RT&S, September, p. 94), was born January 2, 1911, at Bridgewater, S. D. He began his railroad service with the Milwaukee as a section laborer in 1930, later serving as assistant foreman and foreman on extra gangs. In 1942 he entered the U. S. Army and, following his discharge in 1946, became a general gang foreman in which position he served until July 1953 when he was appointed acting roadmaster. In April 1954 he returned to the position of general gang foreman.

O. A. Timberman, who has been promoted to roadmaster on the Milwaukee at Mobridge, S. D. (RT&S, September, p. 94), was born at Bethany, Mo., January 25, 1904. Mr. Timberman began his railroad service with the Milwaukee in July 1923 as a section laborer. He was promoted to assistant foreman on an extra gang in May 1925, and the following month was named section foreman. After working as a section foreman at various locations, he was promoted to assistant roadmaster in August 1943, the position he was holding at the time of his recent promotion.

Bridge and Building

J. F. Emery, trainmaster on the Frisco at Ft. Smith, Ark., has been appointed assistant general foreman B&B & WS, Eastern division, North & South, with headquarters at Memphis, Tenn.

Dale E. Hellickson, whose promotion to master carpenter on the Great Northern at Whitefish, Mont., was announced recently (RT&S, October, p. 86) was born at Medora, N. D., October 17, 1915. He attended North Dakota State College where he received a BS degree in civil engineering in 1938. In January 1940 he began his railroad career with the Great

Railway Personnel (Cont'd.)

Northern in the engineering department at Minot, N. D. He was promoted to assistant to superintendent in August 1941 while working under the supervision of the master carpenter of the Willmar division. In March 1942 he was named assistant master carpenter on the North Dakota division at Grand Forks. He was later transferred to the Kalispell division at Whitefish, Mont., the position he was holding at the time of his recent appointment.

C. R. Malmberg, assistant supervisor B&B on the Chicago & Northwestern at Fond du Lac, Wis., has been promoted to supervisor B&B on the Nebraska division at Norfolk, Neb., succeeding **D. L. Babcock,** who has been transferred to Fond du Lac, Lake Shore division.

W. E. Layman, general foreman B&B on the Illinois Central at St. Louis, has been transferred to the East St. Louis Terminal division with headquarters at Carbondale, Ill., succeeding **T. N. Lingle** whose promotion to supervisor B&B at that same point was announced in the August issue.

R. O. Zittrouer, master carpenter on the Seaboard Air Line at Atlanta, Ga., has retired after 47 years of service. He has been succeeded by **J. M. Eargle,** who has been connected with engineering on the Georgia division since 1934, one year after he became associated with the SAL.

Water Service

Wilbert F. Arksey has been appointed engineer, water service and fuel facilities, on the Great Northern at St. Paul, Minn., succeeding **B. W. DeGeer,** who has retired.

Special

Robert C. Caldwell, formerly southwestern district manager for the Pullman-Standard Car Manufacturing Company, has been named to the newly created position of superintendent of work equipment on the Texas & Pacific, with headquarters at Dallas, Tex. Mr. Caldwell will supervise work equipment forces and will be responsible for the maintenance and general repairs of the railroad's mechanized equipment used in the maintenance-of-way department. His

Robert C. Caldwell

duties also will entail supervision of maintenance and operating cost records on each machine and keeping abreast of new developments in roadway machinery.

A native of Chicago, Mr. Caldwell was with Pullman-Standard for 4½ years, where he supervised the studies of railroad needs and the sale of heavy track equipment similar to the machinery that will be under his supervision on the T&P. His earlier experience includes 2½ years with the Illinois Central in its engineering department and 1½ years with the Jacksonville (Fla.) Terminal Company, where he was engineer in charge of maintenance of way and valuation. He served in the U.S. Air Force from 1943 to 1946.

Association News

Maintenance of Way Club of Chicago

The next meeting of the club will be held on November 22. The principal speaker will be L. C. Blanchard, roadmaster, Milwaukee Road, Minneapolis, Minn., whose subject will be the "Art of Track Surfacing." This will be a "repeat performance" for Mr. Blanchard, as at one of the meetings last year, he delivered an address on "The Art of Track Lining."

American Railway Engineering Association

President Miller has appointed a three-man committee of the Board of Direction to cooperate with the Simmons-Boardman Publishing Corporation in the preparation of the next edition of the *Railway Track & Structures Cyclopedia* to be issued next year. The committee consists of G. M. O'Rourke, assistant engineer maintenance of way, Illinois Central (Chairman); C. G. Grove, chief engineer, Western Region, Pennsylvania; and H. B. Christianson, Sr., special engineer, Milwaukee Road.

The current nominating committee, with F. S. Schwinn, assistant chief engineer, Missouri Pacific Lines, as chairman, will meet at association headquarters November 5, immediately pre-

Meetings and Conventions

American Railway Bridge and Building Association—Elise LaChance, Secretary, 431 S. Dearborn street, Chicago 5. Next annual meeting, September 19-21, 1955.

American Railway Engineering Association—Neal D. Howard, Secretary, 59 E. Van Buren street, Chicago 5. Next annual meeting, March 15, 16 and 17, 1955.

American Wood-Preservers' Association—W. A. Penrose, Secretary-treasurer, 839 Seventeenth street, N. W., Washington 6, D. C.

Bridge and Building Supply Association—L. R. Gurley, Secretary, 201 North Wells street, Chicago 6.

Maintenance of Way Club of Chicago—E. C. Patterson, secretary-treasurer, Room 1512, 400 W. Madison street, Chicago 6. Next meeting, November 22, Hamilton Hotel.

Metropolitan Maintenance of Way Club—Secretary, 30 Church street, New York.

Mississippi Valley Maintenance of Way Club—P. E. Odom, Secretary-Treasurer, Room 1008, Frisco Building, 906 Olive street, St. Louis 1, Mo.

National Railway Appliances Association—J. B. Templeton, Secretary, Gardner Road, Broadview, Ill.; Lewis Thomas, Assistant Secretary, 59 East Van Buren street, Chicago 5.

Railway Tie Association—Roy M. Edmonds, Secretary-Treasurer, 1221 Locust street, St. Louis 3, Mo.

Roadmasters' and Maintenance of Way Association of America—Elise LaChance, Secretary, 431 S. Dearborn street, Chicago 5. Next annual meeting, September 19-21, 1955.

Track Supply Association—Lewis Thomas, Secretary, 59 E. Van Buren street, Chicago 5.

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Association News (Cont'd.)

ceding the Board of Direction meeting on that date, to set up the slate of officers to be elected at the annual meeting, March 15-17, 1955.

The Convention Arrangements committee, directed by Chairman L. H. Laffoley, engineer of buildings, Canadian Pacific, will hold a meeting November 4 at association headquarters to set up the final committee organization and to detail preliminary arrangements for every physical aspect of the next annual meeting, except the program itself.

The Committee on Continuous Welded Rail has scheduled a meeting to be held at the Central Research Laboratory of the AAR at Chicago, November 9.

Metropolitan Maintenance of Way Club

The first meeting of the season was held at the Railroad Machinery Club, New York, on October 28. Following dinner, W. E. Kropp, supervisor of work equipment, Lehigh alley, acted as moderator in a round table discussion on work equipment, in which a number of supervisors of work equipment on Eastern railroads participated.

Northwest Maintenance of Way Club

The November meeting will be held on the 18th at the Midway Civic Club, 1931 University Avenue, St. Paul, Minn. The program of this meeting will be devoted to the subject of welded rail, speakers will be P. J. Hunter, field engineer for the Railroad Department of Linde Air Products Company, and Donald C. Dixon, superintendent of the Rail Welding department of the Metal & Thermit Corp. H. S. Barlow will assist Mr. Hunter in his part of the program. The Railroad Department of Linde was formerly Oxweld Railroad Service.

Mississippi Valley Maintenance of Way Club

The November meeting of the club will be held on the 8th at the usual place, the Hotel De Soto at St. Louis. The principal item on the program will be the showing of a film entitled "On the Button," provided by the Union Switch & Signal Co. The film deals with the operation of hump-retarder yards. Additional commentary will be made by J. J. O'Toole, general manager, Milwaukee Road, who will also conduct the question-and-answer period. The October meeting, held on the 11th, drew an attendance of 177 despite rainy weather. Membership as of the October meeting was 723.

National Railway Appliances Association

Application forms for space at the exhibition of the National Railway Appliances Association, to be held at the Coliseum, Chicago, March 14-17, 1955, during the annual convention of the American Railway Engineering Association, were mailed October 12 to prospective exhibitors. Since this is the first exhibit of maintenance-of-way materials and equipment since 1953, considerable advance interest is being shown in this opportunity to display improved appliances and labor-saving work equipment. Requests for space should be sent to Lewis Thomas, director of exhibits, 59 East Van Buren St., Chicago 5, in time for the first allocation of space to be made on December 9.

Supply Trade News

General

American Creosoting Company Celebrating 50th Anniversary

In 1904 the Columbia Ceosoting Company started wood-preserving operations for the Big Four in a plant at Shirley, Ind. This company went on to become the American Creosoting Company. The latter company is, therefore, celebrating its 50th anniversary this year.

The story of this company has been one of growth and service to the railroad industry. From the single plant at Shirley, the operations of the company have grown until it now has 24 treating plants having a maximum treating capacity of 60 million cubic feet per year. It is estimated by A. L. Kuehn, president of the company, that the increased service life from wood that has been realized as a result of the company's wood-preserving activities has contributed directly to the saving of three to four million acres of forest.

The company is also noted for the fact that one of its founders, C. B. Lowry, conceived the treating process that bears his name and which proved revolutionary in the timber-treating industry. Mr. Lowry developed the idea for his process about 1902, demonstrated it in an experimental plant at Riverside, Ohio, in 1903, and first used it commercially at the Shirley plant of the Big Four in 1904.

Armco Drainage & Metal Products, Inc., a subsidiary of **Armco Steel Corporation,** Middletown, Ohio, has announced a major expansion of its activities in the field of prefabricated steel buildings. First step in putting the expansion program into effect will be the organization of a new department. Called the Steel Buildings Department, this group will handle the expansion of Armco's line of buildings and building products and the more complete development of the general market for prefabricated industrial, commercial, and farm buildings.

Named to head this new department is **D. H. Malcom,** formerly manager of

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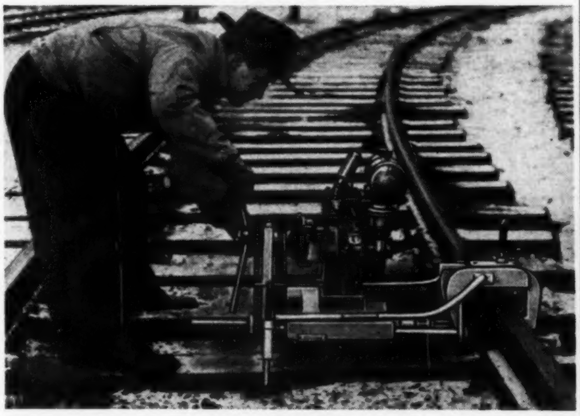

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Grinder's 360° swivel engine mount prevents short bends and kinking of flexible shaft . . . clutch assembly in the engine protects shaft from overload . . . three position wheel clears switches and crossovers easily . . . light and compact, it gets on and off the track fast . . . quickly adaptable for auxiliary equipment: Straight Wheel Hand Piece, Angle Hand Piece for Cup Wheel, Cross Grinder Guide and Track Drill.

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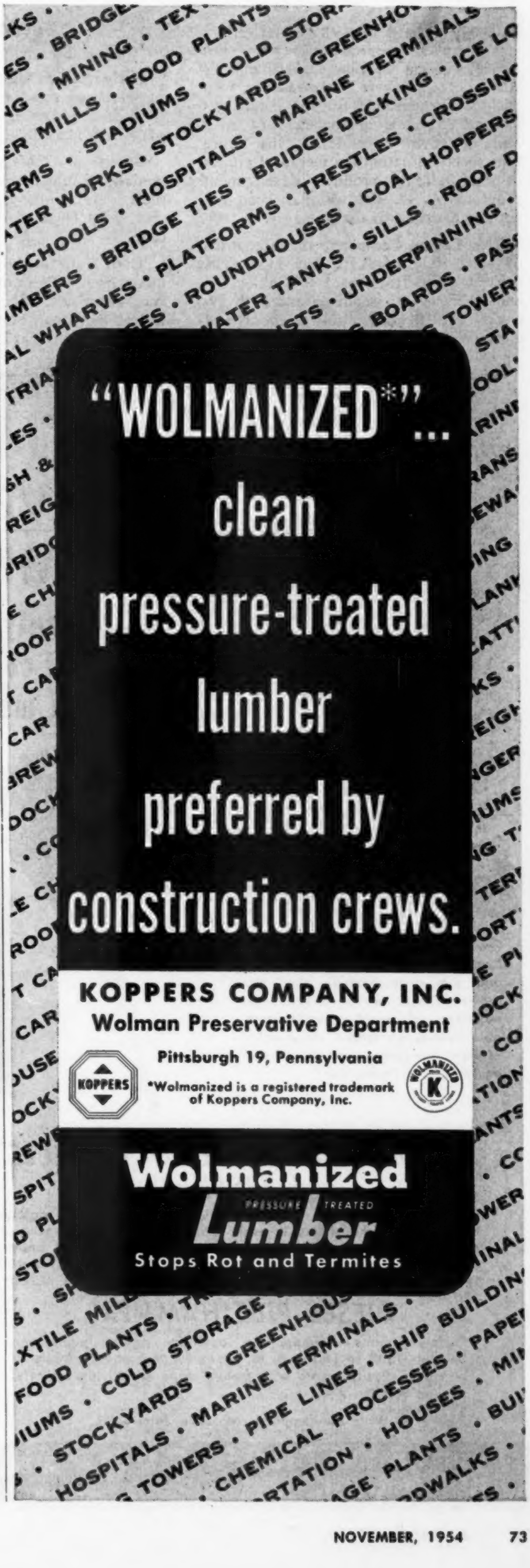

Supply Trade News (Cont'd.)

the Marketing Service Department of Armco Steel. **Robert Blickensderfer,** who has been responsible for the company's progress to date in the field of steel buildings, will now devote his entire time to coordinating the technical phases of the building products development program. **A. H. Baldwin** has been appointed assistant to the manager.

The Lehon Company, manufacturers of Mule-Hide products, has moved its general office from 4425 S. Oakley avenue, Chicago, to Madison and 25th avenues in Bellwood, Ill., a suburb of Chicago.

Personal

Herbert G. Mastin, assistant vice-president of the Eastern Railroad division of the Dearborn Chemical Company, has retired.

George W. Casey, formerly superintendent of manufacturing operations for the Lehon Company, has joined the Railway Sales Division of that firm at Chicago.

T. A. Horn has been appointed service manager for **Fairmont Railway Motors, Inc.,** effective October 1, with headquarters at Fairmont, Minn., to succeed **Carl W. Brhel,** who has retired.

Jim Sutter has been named sales engineer for the **Frank G. Hough Company** at Libertyville, Ill.

J. A. Smith has been appointed sales representative of the **Track Equipment Department** of **Pullman-Standard Car Mfg. Co.,** succeeding **R. C. Caldwell,** whose resignation to become superintendent of work equipment on the Texas &

J. A. Smith

Pacific is announced elsewhere in these columns. Also advanced to the position of sales and service representatives in the Track Equipment Department are **W. E. Porter, H. J. Dumich** and **Harry Peaker.**

Walter E. Heimerdinger, whose retirement as assistant chief engineer of the Rock Island is noted elsewhere in these columns, has been named manager, Railway Division of the **Camef Equipment Corporation** at Chicago.

Obituary

George J. Diver, retired vice president of the Morrison Railway Supply Corporation, died September 23, at Indianapolis, Ind.

WISCONSIN HEAVY-DUTY *Air-Cooled* ENGINES

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Projected returns from 42.6% of plants contacted showed an estimated 678 plants using engines in the stated category, representing total engine purchases of 2,727,216.

Answering the question: "Who makes the Internal Combustion Engines you Use?" . . . Wisconsin Motor Corporation received 132 mentions, as against 105 for the second place builder, 56 for No. 3, 51 for No. 4 — in a list of 41 classified engine manufacturers.

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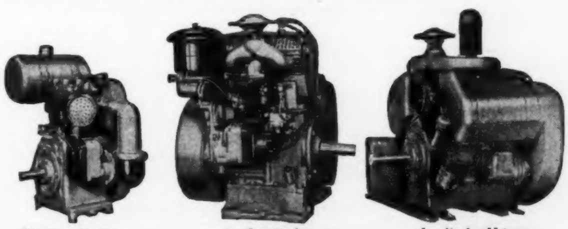
This outstanding preference for Wisconsin Heavy-Duty Air-Cooled Engines (although limited to a power range of 3 to 36 hp. in a broad survey classification including ALL engines below 60 hp.) provides tangible evidence that "WISCONSIN" rates first among men who know engines best. We'd like to count you among them.



Single-cylinder 3 to 9 hp. | 2-cylinder 7 to 15 hp. | 4-cylinder V-type 15 to 36 hp.

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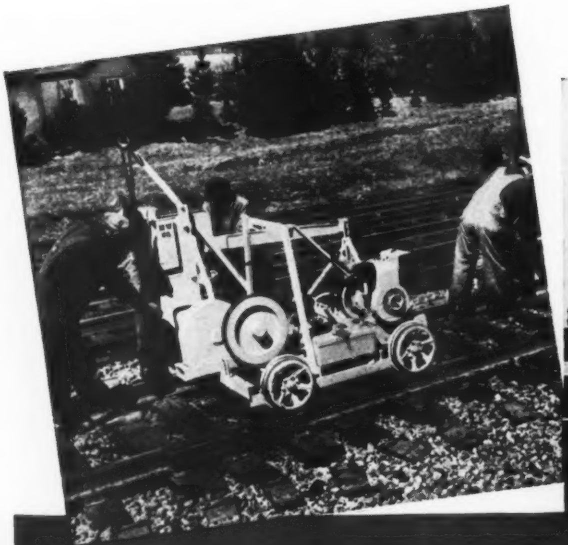

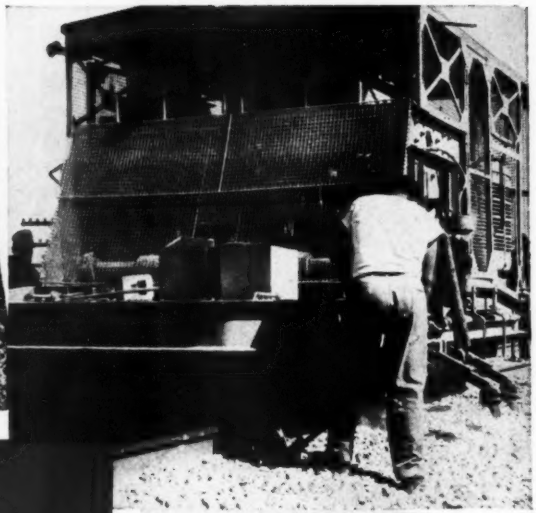

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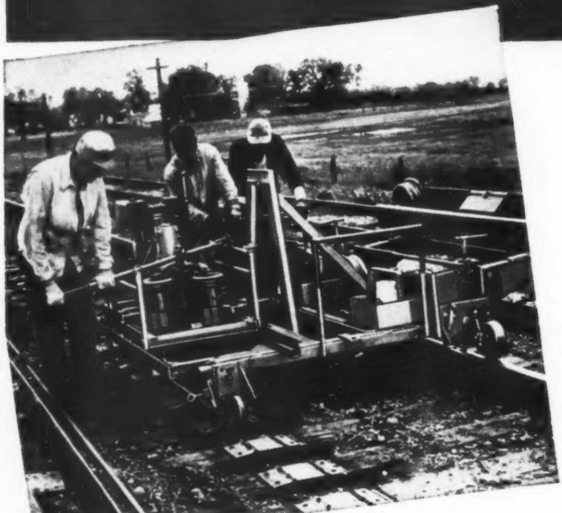

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